23 SEPTEMBER 1955

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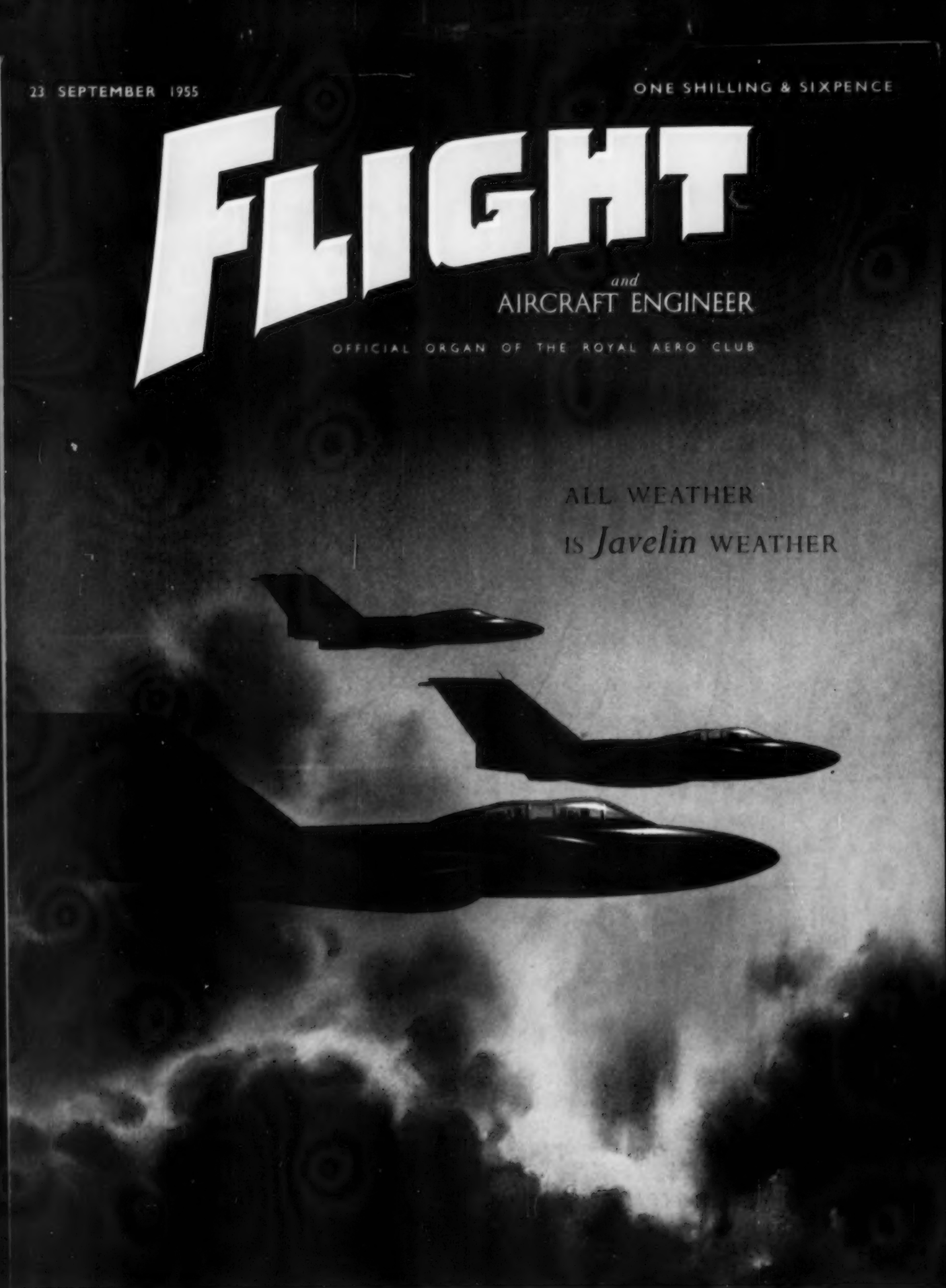

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(SYNTHETIC)

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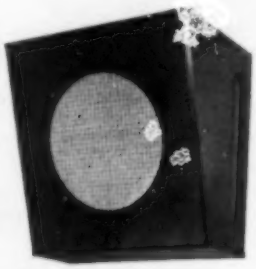

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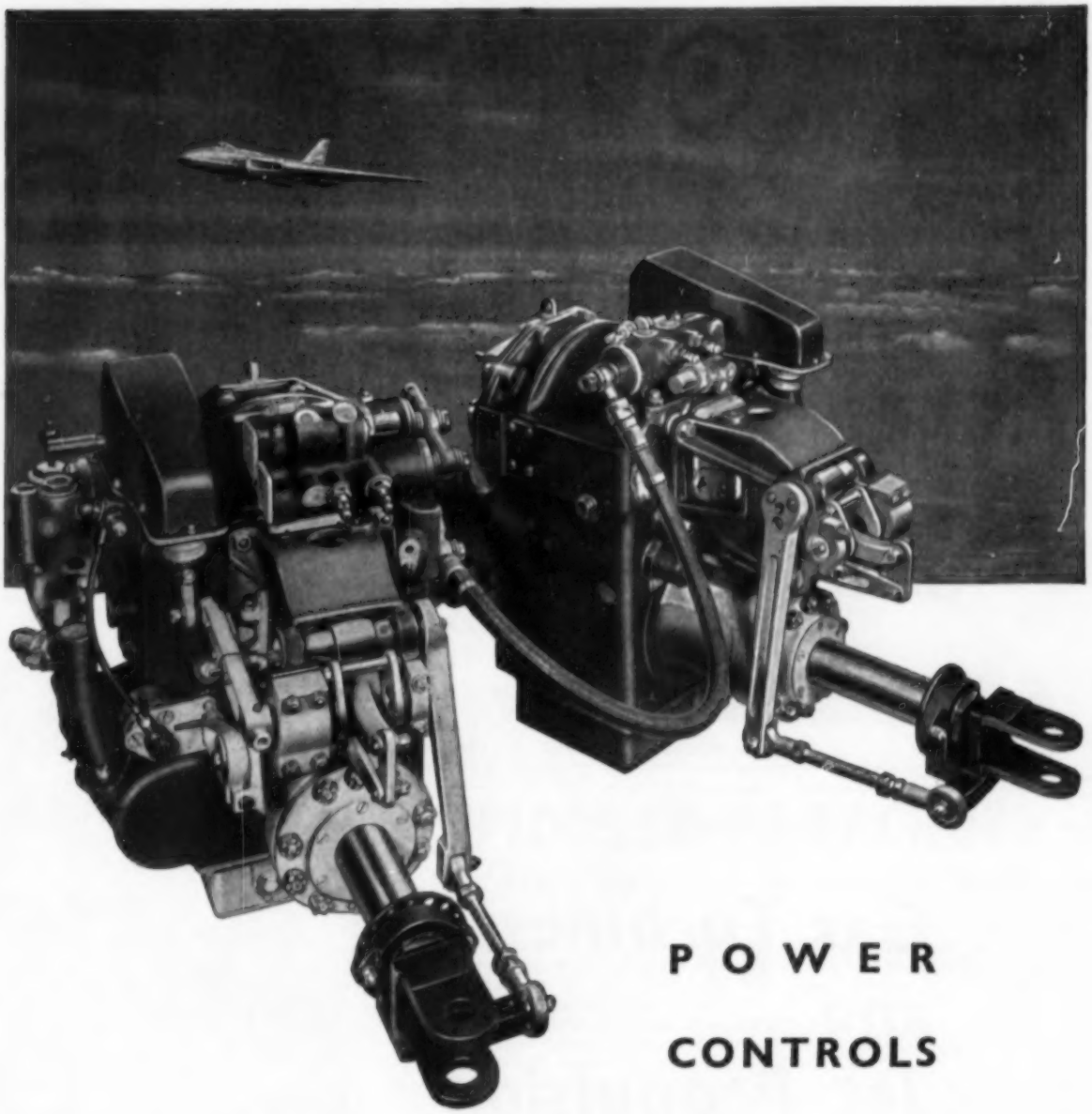

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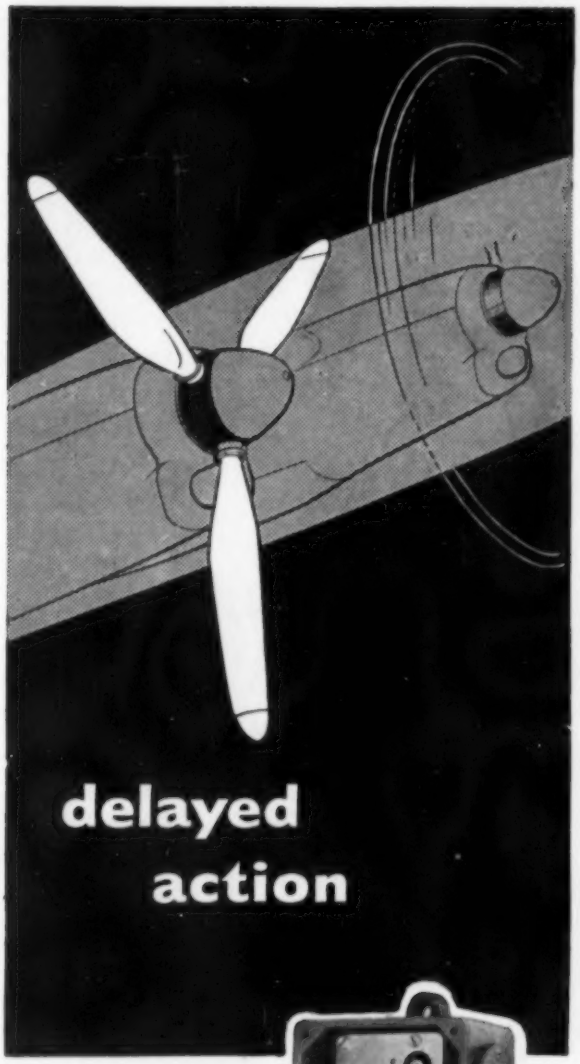

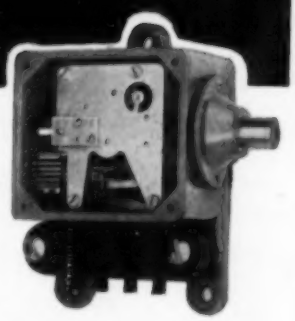

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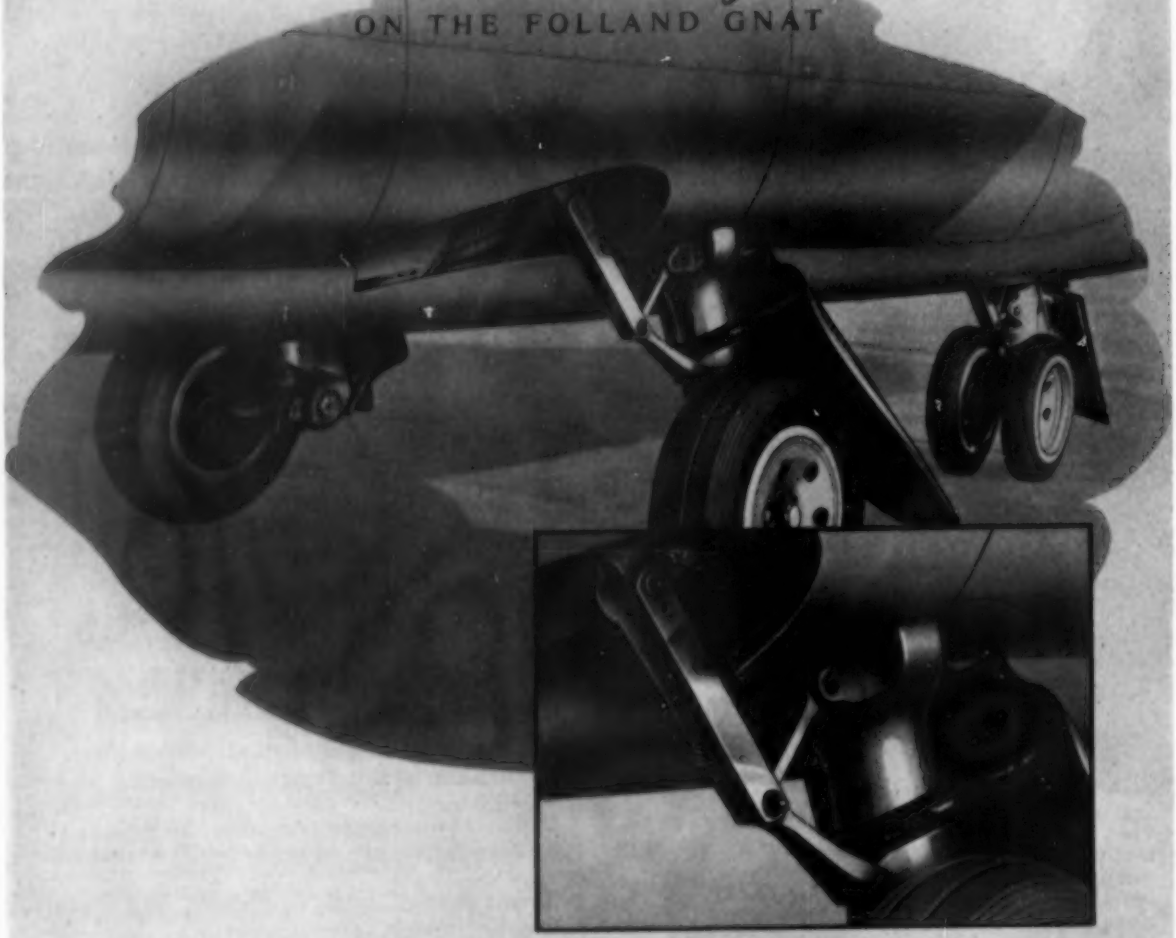

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Domestic Air Transport

IT has been said that there is less reason for air transport in the British Isles than in most other countries. In the sense that the distances between cities are short and that there exist very large networks of railways and roads we can to some degree subscribe to that opinion. These two factors, and the usually unreliable weather, have undoubtedly done much to discourage private flying also; and as a result, let it be noted, the industry builds today only one light aircraft for home sale or export.

But for commercial aviation the position is changing, and the opportunities and need to increase the extent and scope of air travel at home can both be clearly seen. Internal expansion will be closely associated with international services; and the facilities having been provided, the speed with which the public start to avail themselves of them will depend upon publicity and the attraction, frequency and reliability of the services offered. People must not be let down, nor must they be uncomfortable.

Flying as a means of travel is now less expensive, both in relation to wages and by comparison with alternative means of travel. The ordinary family's urge to travel farther from its home and to see more of these beautiful islands and of European countries grows every year. It is air travel which makes quite ambitious journeys possible in the period of an ordinary holiday, and even in a long week-end. The summer trek to Blackpool or Southend, pleasant though it may be, is no longer the answer every year.

Factors and trends in favour of more flying for more people of all incomes include lower fares in comparison with increasing costs of rail and road travel; the outdated conditions of rail travel and the exasperatingly congested roads; a wider variety of regular and seasonal air services to a greater choice of destinations; increasing use of larger, faster and more efficient aircraft; and safer, more dependable and more regular services, largely made possible by improved navigational and communications equipment. (A recent television programme showed most convincingly the efficiency of modern radar approach and landing aids in bad weather.) Starting next week, an ingenious combination service known as Coach/Air will operate economically between English cities and Paris, so bringing the possibility of a visit to the French capital closer to many more who have to keep a careful check on their budgets.

On the negative side can be listed a number of matters which need consideration and action, both by the Government and individuals. For example, independent operators still lack freedom to introduce and develop new services (the views of B.I.A.T.A. were mentioned in *Flight* of September 16th). Without such freedom, and lacking approval of services for a period of years, they cannot afford to order new aircraft. The scarcity of modern equipment is a serious matter both to operators and to the British aircraft industry. Last week we quoted Mr. Parkes, the S.B.A.C.'s president, on the need for a larger home market. On several services there can be no replacement for the Dakota in existing circumstances. Its market price and running costs are such that it alone can be operated profitably without a long-term route agreement over which expensive new equipment could be amortized.

The smaller London-based operators look like being without landing space or servicing facilities if the remaining perimeter airfields are closed down as planned. Elsewhere, new airports are needed, and designers may make their provision easier by producing medium-sized transports capable of operating from very small strips close to cities and towns. The Twin Pioneer is an example. The helicopter, also, undoubtedly has an important part to play on our domestic services of the future.

Then the attitude of official departments is not calculated to encourage expansion. For example, many M.T.C.A. airfields are staffed only during normal office hours; Customs facilities are inadequate, and in some instances are withheld altogether. So much fuel is stored in the country that storage capacity has been exhausted (and other distillation products are kept in short supply until more petrol is used); yet the petrol tax is kept at its exorbitant level—a great and unjustified burden on commercial aviation and transport in general. These are some of the things which stand in the way of home air transport development, from which so much advantage to the whole country would accrue.

LOUD CHEERS and waving (red?) flags signalled the departure of the first service by an Il-14 of East Germany's airline ("A Rival Lufthansa," below).

FROM ALL QUARTERS

A Rival Lufthansa

WHAT was described as the "first official flight" of the new East German airline took place on September 16th, when an East German Government delegation flew from Berlin to Moscow. Like its West German counterpart, the airline is known as Deutsche Lufthansa; it was established on June 1st, 1954, with headquarters at Schoenefeld Airport, Berlin, and is equipped with Il-14s, one of which is seen in the photograph on this page. At present the pilots are Russians, though East German pilots are believed to be under training. The airline is headed by Herr Arthur Pieck, a son of the East German president.

C.A.S. in North America

THE Chief of the Air Staff, Marshal of the Royal Air Force Sir William Dickson, left by air for the United States and Canada last Monday and is to return on Sunday.

He is having discussions in Washington with Gen. Twining, Chief of Staff of the U.S.A.F., and other senior American officers, on matters of mutual interest; these, it is officially stated, include co-operation between Strategic Air Command of the U.S.A.F. and Bomber Command of the R.A.F.

From Washington the Chief of the Air Staff was due to go on to Ottawa for discussions with Air Marshal C. R. Slemon, Chief of the Air Staff, R.C.A.F.

C.D. Helicopter

THE Home Secretary, Maj. Gwilym Lloyd-George, made a flight from London's South Bank site on September 14th in a helicopter—Whirlwind G-AOCF, chartered from B.E.A.—which is being used in a series of trials by Civil Defence.

Explaining the project, the Home Secretary said that it was desired to find how such machines could best be employed in air-raid damage reconnaissance. In the course of the inquiries the helicopter would visit all the C.D. regions in England, Wales and Scotland. Other work in which such aircraft could prove valuable, added Maj. Lloyd-George, might be in the aerial measurement of atomic-bomb fall-out. Air-to-ground loud-hailer experiments would also be made.

Exports Up

AIRCRAFT exports from the United Kingdom last June—figures for which have recently been announced—totalled £5,070,741, compared with a monthly average of £4,649,086 over the previous twelve months. Imports, at £1,139,496, were 22 per cent of exports; in the previous twelve months they had averaged £1,976,993, which represents 42 per cent of exports in the same period.

The export total included complete aircraft to the value of £3,419,050 and engines to the value of £1,397,137.

Titanium Cut-back

THE American Office of Defense Mobilisation last week announced the suspension of the Government programme to assist in the expansion of titanium-sponge capacity. The director, Mr. Arthur S. Flemming, stated that "sponge production at present is considerably ahead of the indicated rate of military utilization of the metal." He added that sponge capacity under Government contract appeared to provide for projected military use until 1957, but that the programme would be kept under continuous study.

At present the U.S. Government has sponge-production contracts with five companies: Cramet Inc. (6,000 tons); Dow Chemical Company (1,800 tons); E. I. du Pont de Nemours and Co. (2,700 tons plus 900 tons not under contract); Titanium Metals Corporation of America (3,600 tons); and Union Carbide and Carbon Corporation (7,500 tons). Within the past two years the market price of sponge has dropped from $10,000 to $7,900 per ton, and it is reasonable to expect further reductions. Production is expected to reach 8,000 tons this year, and 22,500 tons capacity by 1957, of which 21,600 tons are currently under contract.

Major Air Defence Exercise

AT noon today, September 23rd, this year's major United Kingdom air defence exercise begins, code-named "Beware." The first phase will last until midnight on Sunday. The two other phases will take place between noon on Tuesday and midnight on Wednesday and from 0500 hr on Saturday, October 1st, and the afternoon of Sunday, October 2nd.

The object of the exercise is to test the strength of the country's air defence and to exercise the various elements in a full-scale operation. All commands will be involved, together with some units from Germany and aircraft of the U.S.A.F. Strategic and Tactical Air Commands. For the first time, large numbers of Hunters and some Valiants will take part. The A.O.C.-in-C. Fighter Command, Air Marshal Sir Dermot Boyle, will be in command of the operations.

CAPT. MAX HOLYMAN, who will be chief pilot of Australian National Airways' new helicopter unit, is at Filton for a course on the Sycamore, which A.N.A. will use; he has received basic helicopter training with Fisons Pest Control, Ltd. Here he is seen seated in a Sycamore cockpit and talking to test pilot Peter Wilson.

***HUNTERS' SALUTE:** An arrow-head formation of Hunters of No. 111 Sqn. from North Weald flies past during the drumhead service held at Biggin Hill last Sunday. An illustrated account of Battle of Britain week appears overleaf, and further pictures on page 537*

Parts of exercises of this kind usually take place over the week-ends in order to allow the participation of a large number of Auxiliary pilots and ground-crews and fighter control and airfield defence personnel, as well as the Royal Observer Corps.

Capt. E. H. Lawford

WE regret to record the death, at Bexhill on September 15th, of Capt. E. H. ("Bill") Lawford, A.F.C. Seventy years of age, he had been ill for some three years.

To Capt. Lawford fell the distinction of being Britain's first airline pilot, for on August 25th, 1919, he inaugurated the first regular air service to be flown by a British company. His aircraft was a D.H. Airco 4A of Air Transport and Travel, Ltd., and the route was between Hounslow and Le Bourget, Paris. The inaugural outward journey, flown with a "payload" of one journalist and a mixed cargo of mail, grouse and Devonshire cream, took 2½ hr.

Long-range Whirlwinds

TWO Westland Whirlwinds recently ordered (picture, page 533) by Royal Dutch Shell left Eastleigh Airport, Southampton, last Tuesday morning on the longest flight ever attempted by a British helicopter. Equipped with long-range fuel tanks, they were bound for Doha on the Persian Gulf, a distance of over 3,000 miles, which it is planned to complete in six days. The route will be across France, Italy, Greece, Cyprus and Iraq. The pilots are Alan Bristow and Alan Green.

In service, the helicopters will be used to fly workmen and supplies from shore bases to offshore oil-drilling rigs, on which special platforms have been erected to receive them. Hitherto the labour force and other supplies have been transported in launches, which are sometimes prevented from operating by rough water.

Post-war Research in Canada

THE eleventh British Commonwealth and Empire Lecture of the Royal Aeronautical Society will be presented this year by Dr. J. J. Green, M.B.E., B.Sc., Ph.D., who will speak on *The Growth of Aeronautical Research in Canada during the Post-War Decade.* The lecture will be given at the Royal Institution, Albemarle Street, London, W.1, at 6 p.m. on Thursday, October 6th.

Dr. Green, who emigrated to Canada from England in 1930, worked for the National Research Council until 1943, when he became chief research engineer to the R.C.A.F. After the war he joined the Air Transport Board and served as its chief aeronautical research engineer until his appointment to the Defense Research Board in 1949.

Last year, Dr. Green became the first President of the Canadian Aeronautical Institute, and on September 1st this year took up duties as Defense Research Board representative on the Canadian Joint Staff in Washington. His predecessors as "Commonwealth and Empire" lecturers include Sir Wilmot Hudson Fysh, who delivered the first lecture in 1945; Peter Masefield, whose outstanding 1948 lecture still ranks as a textbook on airline economics; and, last year, H.R.H. the Duke of Edinburgh, who spoke on *Aviation and the Development of Remote Areas.*

Tribute to Robert Blackburn

WORK ceased throughout the Blackburn and General Aircraft factory at Brough last Friday when more than 4,000 members of the firm gathered for an informal memorial service for their late chief, Mr. Robert Blackburn, whose death had taken place suddenly on the previous Saturday. The wings and tailplane of a Beverley spanned the entrance to the crowded hangar, dwarfing the bareheaded workers. Mrs. Phyllis Blackburn, the widow, Mr. Eric Turner (managing director) and relatives and close friends were present.

In a personal tribute to Mr. Blackburn, Mr. Turner said it was not far short of 50 years since he designed, built and flew his first aircraft. It was Robert Blackburn who, in the earliest days of flying, realized what was involved, and staked everything, including life and limb, to perfect the art.

"All of us," continued Mr. Turner, "are very proud that the oldest British aircraft still flying is Robert Blackburn's, much of it built with his own hands. It was he who built the first British all-metal aircraft and it was his aircraft which gave the first demonstration of wireless telegraphy. I do not think there is any aspect of aviation which at one time or another did not benefit from Robert Blackburn's vision, enterprise, ability and unflagging determination. He built every conceivable type of aircraft, as well as piston engines, gas turbines and propellers. Robert Blackburn was one of the first in the world to run a flying school and to see the possibilities of commercial aviation. It is getting on for 40 years since he formed a company to carry freight and passengers across the North Sea. He was undoubtedly one of the greatest men in the history of aviation."

Going on to speak of the other attributes associated with Mr. Blackburn's name, Mr. Turner said that he had "an uncanny ability to infuse his colleagues with a great sense of loyalty, affection, team spirit and confidence. . . . I am sure he died a happy man, well aware of the great progress made by the company he had built up from such small beginnings."

A memorial service is to be held in London—at Christ Church, Down Street, W.1, on Wednesday next, September 28th, at noon.

***THE MOVING SCENE** at Brough as thousands of employees stood silent and bareheaded in one of the big hangars (see "Tribute to Robert Blackburn," above).*

BATTLE OF BRITAIN WEEK

Record Crowds Watch "At Home" Day Displays

THOUGH ten fewer R.A.F. stations were "at home" to the public this year for the fifteenth anniversary of the Battle of Britain—46 as against 56—over 100,000 more people attended the displays. The grand total was more than 1,300,000. The largest attendance was at Biggin Hill.

This was on Saturday; and on the following day there were the usual more solemn observances, including a thanksgiving service in Westminster Abbey and the laying of a wreath at the R.A.F. Memorial on Victoria Embankment by the Chief of the Air Staff, Marshal of the Royal Air Force Sir William Dickson.

During the week, on the Thursday, the now traditional fly-past over London had taken place according to plan at 12.30 p.m. With the exception of the leaders—the anonymously piloted Spitfire and Hurricane—all the aircraft taking part were jet fighters. The spectacle was thus impressive but brief, since the six formations flew by in quick succession at 460 m.p.h. Each formation consisted of 12 aircraft in three boxes of four. First came 12 Hunters from Nos. 1 and 41 Squadrons, Tangmere, led by W/C. P. J. Simpson, D.S.O., D.F.C. The next Hunter formation came from Nos. 257 and 263 Squadrons, Wattisham, and was led by W/C. J. A. Sowrey, D.F.C., whose aircraft was seen to be fitted with link-collector boxes. W/C. J. H. S. Broughton, D.F.C., A.F.C., led the 12 Hunters of Nos. 54 and 247 Squadrons, Odiham, and the final Hunter formation—representing Nos. 56 and 111 Squadrons, Waterbeach—was led by W/C. K. C. M. Giddings, O.B.E., D.F.C., A.F.C. The 12 Naval Sea Hawks from No. 811 Squadron, Ford, led by Lt. Cdr. R. H. Reynolds, D.S.C., A.F.C., appeared to be feeling the effects of the moderately turbulent air more than the swept-wing fighters preceding them; or perhaps slipstream was responsible.

Last of all, making their first official appearance in a fly-past over London, came 12 F-86D Sabres of the U.S.A.F.'s No. 406 Wing, Manston, led by Col. W. S. Harrell.

The Secretary of State for Air, Lord De L'Isle and Dudley, the Chief of the Air Staff, Marshal of the R.A.F. Sir William Dickson, and Lord Trenchard [picture, p. 537] were among those watching the fly-past from Whitehall.

Notes on the "At Home" Day displays at various airfields follow.

Biggin Hill. The name and location of Biggin Hill always make it a popular station for Battle of Britain "at homes"; and, expecting a large crowd, the Air Ministry and the station usually lay on a comprehensive show. This year was no exception, and 275,001 people are estimated to have ranged themselves in the enclosures along the main runway to watch a remarkably varied and concentrated programme. Shackletons, Neptunes, a Sunderland, a Valiant and five F-86Ds flew past from other airfields during the afternoon, but the main demonstrations were based on Biggin Hill itself. Performing in public for the first time were the Hunter F.5s of No. 41 Sqn., showing their manœuvrability in an individual demonstration and their precision formation flying with all the squadron's aircraft. The old-timers were well represented by a Spitfire from Duxford and a Hurricane, while a Bristol Fighter and the recently reconstructed Avro 504 had a splendid dog-fight over an area little larger than a football pitch.

The Army was there in strength, with two groups of parachutists jumping from a captive balloon, and artillery, armoured cars and tanks fighting a pitched battle at the "missile launching site" which formed the set-piece. While the action was in progress 12 Meteors of Nos. 600 (City of London) and 615 (County of Surrey) Sqns. dive-bombed the guns in the face of volleys of break-up shot. The last aircraft then came in again and "dropped" an atomic bomb which was simulated by the explosion of a large quantity of lethal matter in some waste ground on the edge of the airfield. The resulting mushroom of smoke drifted away just as the Meteors came back to land.

S/L. Fifield brought the Martin-Baker Meteor 7/8 over and successfully ejected a dummy at very low altitude, and the Hunter Two-seater showed its redoubtable paces. But the highlights of the show were aerobatic demonstrations given by F/L. Oliver in a Meteor, by a Chipmunk and by Ranald Porteous in the Auster Aiglet; and in formation by Sea Venoms of the Australian Fleet Air Arm squadron which is soon to embark in H.M.A.S. *Melbourne*; by three Meteors of No. 615 Sqn.; and by the four Hunters of No. 54 Sqn. The last named put up a performance well up to their best standards of showmanship and precision. Their performances are still improving, despite the fact that they are already of international standing.

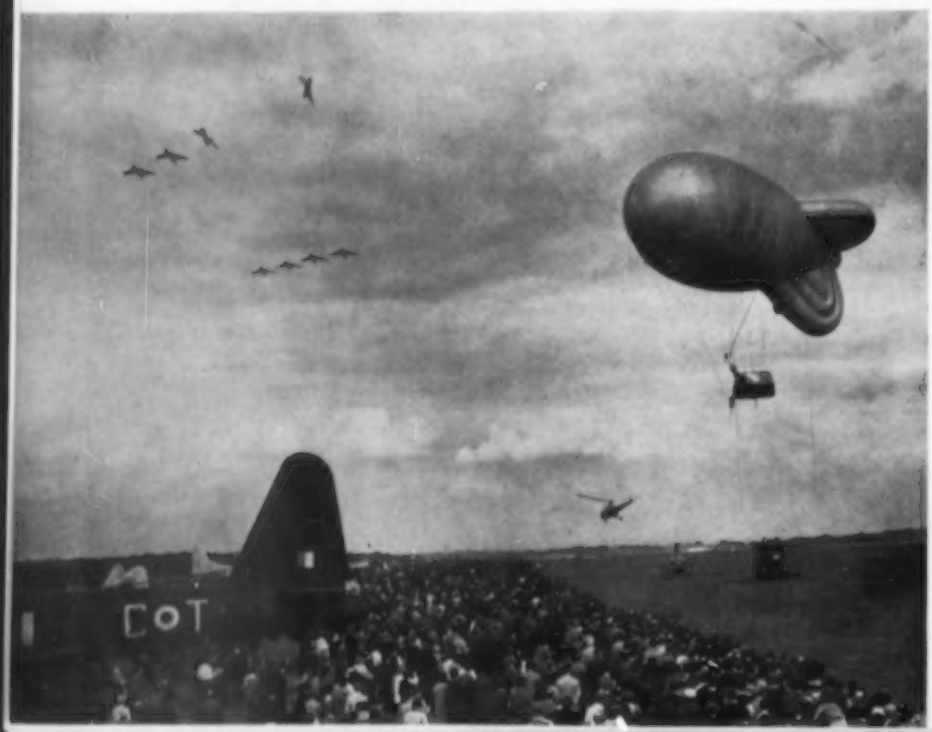
The afternoon's flying had been opened by the arrival of a Silver City Superfreighter, which then unloaded two *Evening News* vans and a Hillman convertible carrying Jack Hawkins and family. During the afternoon a helicopter brought in the latest edition of the newspaper, and Rotorfilms, Ltd., displayed a familiar advertisement from their Agusta-Bell 47.

The static park contained a large number of aircraft of all types, both Service and civil, and numerous items of armament were on show. Children could fire the cannons of a Meteor into the stop butts and have their photograph taken while doing it; and a full-scale fun-fair was raging on the southern boundary of the airfield. When the show ended the crowds were let loose on the airfield, but an hour later the traffic on the roads back to London was once more almost normal, after careful police work and assistance from a F.A.A. Dragonfly helicopter piloted by Lt-Cdr. Sproule, from Ford.

At Tangmere, the well-known Fighter Command Station near Chichester in Sussex, the emphasis was on new equipment. Apart from the fact that Tangmere has its own Hunter squadron, there were visiting "turns" representing almost every type in current service, plus several "new and experimentals" from M.o.S. or makers' airfields. And this variety was not limited to the flying display; lined up on the tarmac for the edification of the thousands of visitors of all ages were a Hunter F.5, Meteors Mk 7 and 8, Venom, Vampire, Canberra, Shackleton, Valetta T.3, Anson, Provost, Balliol and Chipmunk. These aircraft were not roped off, and never before can so many inquisitive heads, old and young, have been poked inside so many jetpipes and wheel-wells. Fortunately, there were airmen on guard to discourage the more destructive varieties of stroking and prodding.

Only some of the high-spots of the flying programme can be mentioned here, for, including formation and stream take-offs and landings, there were 40 separate items.

Proceedings were opened in noisy and



A fine general impression of the scene at Biggin Hill on Saturday. Hunters are breaking for a stream landing; near the paratroop balloon a Dragonfly is taking off for a scoop-net demonstration, and on the ground is an Agusta-Bell helicopter. The big tail on the left belongs to a Neptune of Coastal Command.

spectacular style by four Hunter F.5s making low-altitude, high-speed runs along the front of the enclosures; a Balliol pilot half-rolled on to his back immediately on take-off and embarked on a long, slow inverted climb until at long last his Merlin coughed its protest; and a Naval Dragonfly (the R.A.F. version having failed to materialize), flown by Lt-Cdr. Simpson, performed a new version of the winch rescue by lowering the succoured victim into a moving Land-Rover.

Several formation aerobatic turns were offered. They included three Meteor 8s of No. 34 Sqn (F/Os Deverson, Young and Reid), which did some nimble position-changing and finished with an effective downward "bomb-burst;" and four Vampires from Middleton St. George, which went through a closely-knit repertoire.

Of the various single aerobatic items, the contribution of F/L. Kobierski, R.C.A.F., in a Meteor N.F.11, was the most unconventional, all his manœuvres being done in an unusually slow tempo which would have emphasized any faults. As distinctive in a quite different manner was F/L. Irving (flight commander of No. 1 Sqn.) in a Hunter; whereas upward rolls are familiar enough, one of Irving's most striking tactics was a long series of rolls downward at an angle of perhaps 40 deg.

Notable visiting demonstrators were Leslie Colquhoun in the Swift Mk 5, with quick passes, rolls, and a thunderous turning-on of re-heat; the orange Avro 707A, flown by F/L. Mellar from Farnborough; and the two Battle of Britain veterans, Hawkers' blue-and-gold Hurricane G-AMAU, flown by Duncan Simpson, and the Spitfire, handled in highly characteristic style by Jeffrey Quill. The throaty pulsation of the old Merlins must have brought many a memory to ex-Service people among the spectators.

Between the items, and sometimes during them, there were fly-overs by the various station-touring aircraft, ranging from a Sunderland to a Valiant; and there was the arrival of a distinguished visitor—the Air Minister, Lord De L'Isle and Dudley, V.C.—not in a V.I.P. transport but in a Vampire Trainer.

Towards the end of the afternoon was a set-piece considerably more convincing than such affairs usually are; six Varsity "bombers" approached the airfield in close formation to attack it, and the sky became filled with a milling horde of Meteors making quarter attacks upon them.

Valley. In spite of this summer's sunshine record at Valley, Anglesey, a cloud layer spread over from the west early on September 17th, and there was a fresh breeze in from the Irish Sea. Nevertheless some 6,500 people came to see the display, including a number of keen souls from as far away as Manchester, Liverpool and Stoke-on-Trent. They were rewarded by seeing a unique example of Navy/R.A.F. co-operation, for Valley is the home of No. 7 F.T.S., which trains Naval pilots on Vampire T.11s and 5s.

One of the most impressive displays in the programme was indeed the Station's own Vampire aerobatic team, led by F/L. Bysshe Shelley. A polished performance of solo aerobatics was later given by M. Plt. Vic Sznapka, one of the team.

The "double interest" at Valley was heightened by two naval formation teams. From Stretton, 1831 R.N.V.R. Squadron, with Attackers which they had first seen only seven weeks ago, hung together as though steel hawsers joined them. But first place went to 800 Squadron from R.N.A.S. Brawdy with their Sea Hawks. The formation team was led by Lt-Cdr. R. D. Lygo, while an individual demonstration—including a superb hesitation roll—was performed by Lt-Cdr. A. J. Leahy.

The individual displays (Chipmunk, Provost, Balliol and Meteor) were all good, but seemed all so high and so far away; their individual manœuvres were well-practised and excellently performed, but there was a lack of showmanship and a sameness about their performances.

Of the individual flypasts, the Gannet (switching one of its engines on and off) was most interesting, as was the Shackleton with two airscrews feathered. The single Valiant, flown perhaps a hundred miles to cruise past once only at 500ft, seemed somewhat disappointing.

Two novelties proved a great success. Two Vampires tore in for rocket attacks from over the sea without warning and, tracked by Army A.A. guns, succeeded in setting fire to an aircraft on the ground. The fire crew put out the fire in 42 sec. A rescue demonstration of two men from a dinghy adrift on the airfield was made by a yellow Whirlwind of 22 Squadron, Coastal Command, newly arrived at Valley from Thorney Island.

To end the flying display, the aircraft in the static park took off in reverse order of performance, so that a steady procession flew past the crowd, which suddenly reappeared from the exhibition hangars in full strength to watch them leave.

On the ground, there were innumerable exhibitions and attractions: the "Battle of Britain" film played continuously to packed houses throughout the afternoon and Fairey, Saunders Roe and de Havilland provided interesting stands straight from Farnborough. Although it is too early yet to quote a final figure, an early estimate of the amount to be sent to the R.A.F. Benevolent Fund and the R.A.F. Association is around £500.

(Top) Sunderland SZ 567 was one of the numerous aircraft that toured various stations; in each case it made a low and impressive fly-past.

(Centre) This oddly contrasted formation was seen at Debden—a Varsity flanked by Chipmunks.

(Below) A scene typical of almost any of the stations attended by record crowds on Saturday: interest in—and entrance to—a Lincoln in the "static" hangar at Debden.

"Flight" photographs

HERE AND THERE

Variable Intake

IT is reported that the forthcoming North American F-107A (Super Sabre development) will have a variable-area air intake duct "in order to improve thrust." This is likely to be the first occasion upon which such an intake has been employed; on highly supersonic aircraft (M = 1.5 plus) it is convenient to use an intake centre-body which can be wound in and out to alter the area.

In a Low French Dive?

ACCORDING to a French press report, the Caravelle turbojet airliner achieved the speed of 1,050 km/hr (650 m.p.h.) during a recent test flight. The aircraft was in a "shallow dive" at the time.

Helicopter Ice Rescues

LAST week the remaining people on board the Norwegian freighter *Jopeter*, trapped in the ice off Koldeway Island, East Greenland, were taken off by one of three U.S.A.F. S-55 helicopters, which had been making a series of rescue flights since the vessel lost her propeller ten days before. The aircraft took the passengers and crew to a Norwegian sealing ship lying in clearer waters 12 miles away.

Alive and Well

MR. F. SIDNEY COTTON has good-humouredly characterized as "greatly exaggerated" the report of his death, quoted in our issue of September 9th from Australian sources. Apparently there was confusion with the name of a relative who was concerned with the design of aircrew pressure suits. Mr. Sidney Cotton, whose name is associated with the Sidcot flying suit, is in this country, and very much alive.

Bangs "Old-fashioned"

WE are told by the S.B.A.C. that there was no official ban on supersonic bangs at the display this year. Members of the Society whose aircraft were capable of producing bangs were approached in advance. From their answers it appeared that this sort of demonstration was regarded as old-fashioned, and not likely nowadays to help sales. There is no reason to believe that there would have been a Ministerial ban on supersonic flying had the request been made. An especial dispensation is necessary if it is intended to fly supersonically below 30,000ft.

FLAT CAR: Four-wheel steering is used on this vehicle, which has been designed by North American's Dan Coleman. As well as towing F-100s, it can drive under them and start the J57 turbojet in 14 sec, using an hydraulic torque converter coupled to the vehicle's engine.

Mr. A. M. Bates

WE regret to learn of the death, in a flying accident on September 11th, of Mr. Anthony Michael Bates, B.A. (Cantab.), Lieut. T.A., R.A., son of Mr. F. Bates, managing director of Auster Aircraft, Ltd. The accident occurred at Otterburn, Northumberland, during a Territorial Army training flight. A keen pilot, Lt. Bates took a major part in the intensive flying trials of the Auster A.O.P.9.

Lycoming Turboprop

PRELIMINARY information has now been released on the Lycoming XT53 turboprop, currently rated at 825 h.p. Intended for both fixed and rotary-wing applications, the production T53 will have a front-end drive, with the reduction gearbox mounted ahead of a true annular intake. Alternatively, shaft power can be extracted at the rear end or, if necessary, at both ends. Several experimental engines have been built, and tested with two-blade airscrews of 10ft 6in diameter. The T53 seems to be a single-shaft engine, with a very slim axial compressor and a large cannular combustion chamber.

Executive Inspection

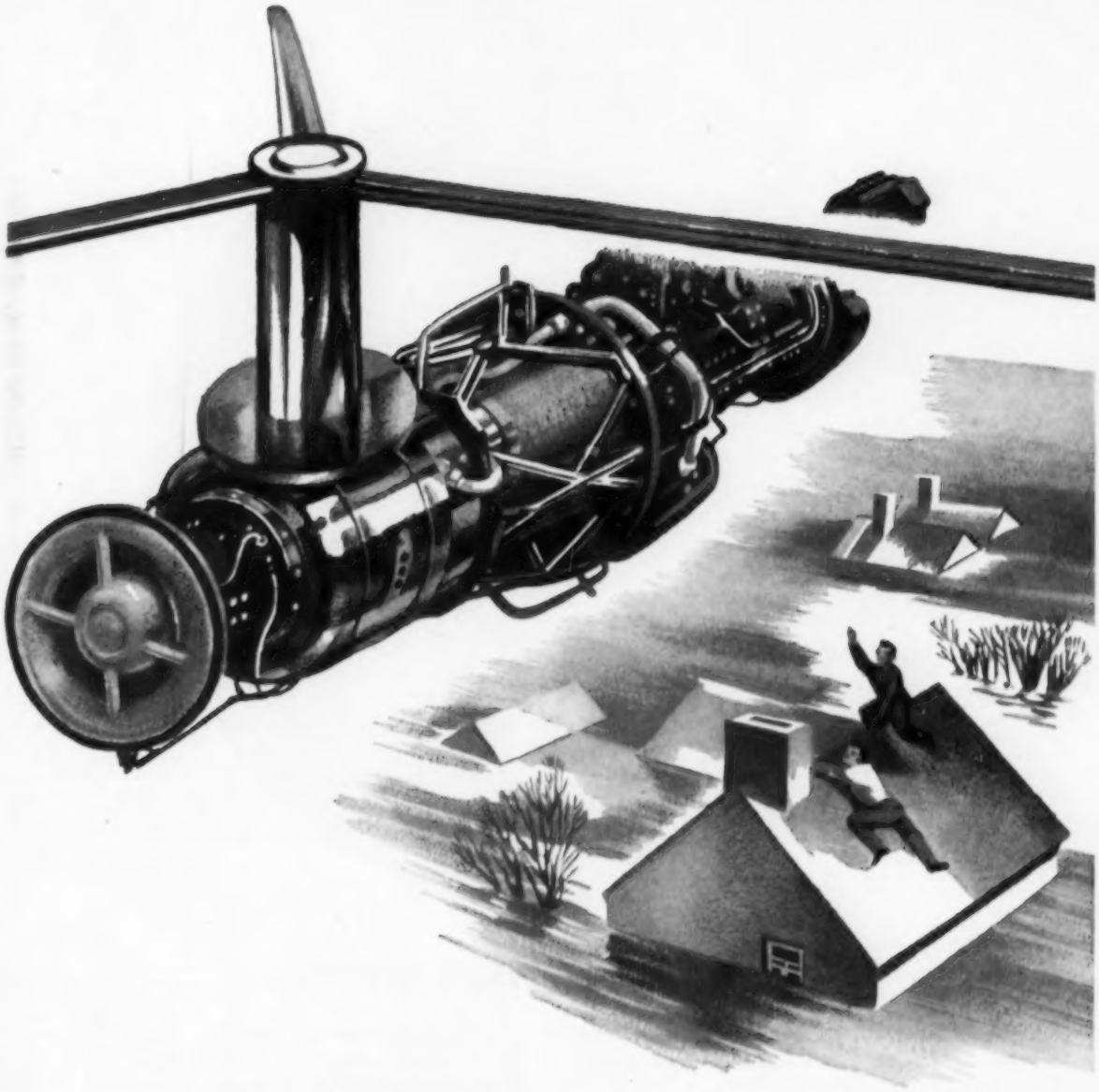
TWO Hawker Siddeley executives, Sir Frank Spriggs (managing director) and Sir Roy Dobson (managing director of A. V. Roe) left Southampton for New York last week in the *Queen Mary*. They are to visit the group's factories in Canada.

Netherlands Helicopter Progress

ANNUAL reports of the Netherlands Institute for Airplane Development and the National Aeronautical Research Institute at Amsterdam show that considerable progress has been made with the two seater turbine-powered helicopter designed by S.O.B.E.H., a committee specially formed for the purpose. Negotiations now in progress with three Netherlands companies may result in the formation of a firm for its development and manufacture.

ROTATING-WING DEVOTEES gathered recently at the Dorchester Hotel for the biggest-yet annual dinner of the Helicopter Association, nearly 400 were present.

MR. L. J. DUNNETT, Deputy Secretary of the M.o.S., was a recent visitor to Avros; he is seen here with Sir William Farren (left) and Sir Roy Dobson.



The heart of a good helicopter

A helicopter engine that works without driving shafts and driving gear—that's the Napier Oryx. It's a 750 gas h.p. turbo-gas-generator, designed for helicopters propelled by jet reaction at the rotor blade tips. It weighs less, it's less complex and it's easier to maintain than conventional helicopter power systems. The Oryx is a step forward—and upward—in helicopter propulsion, and an engine of great importance to helicopter operators.

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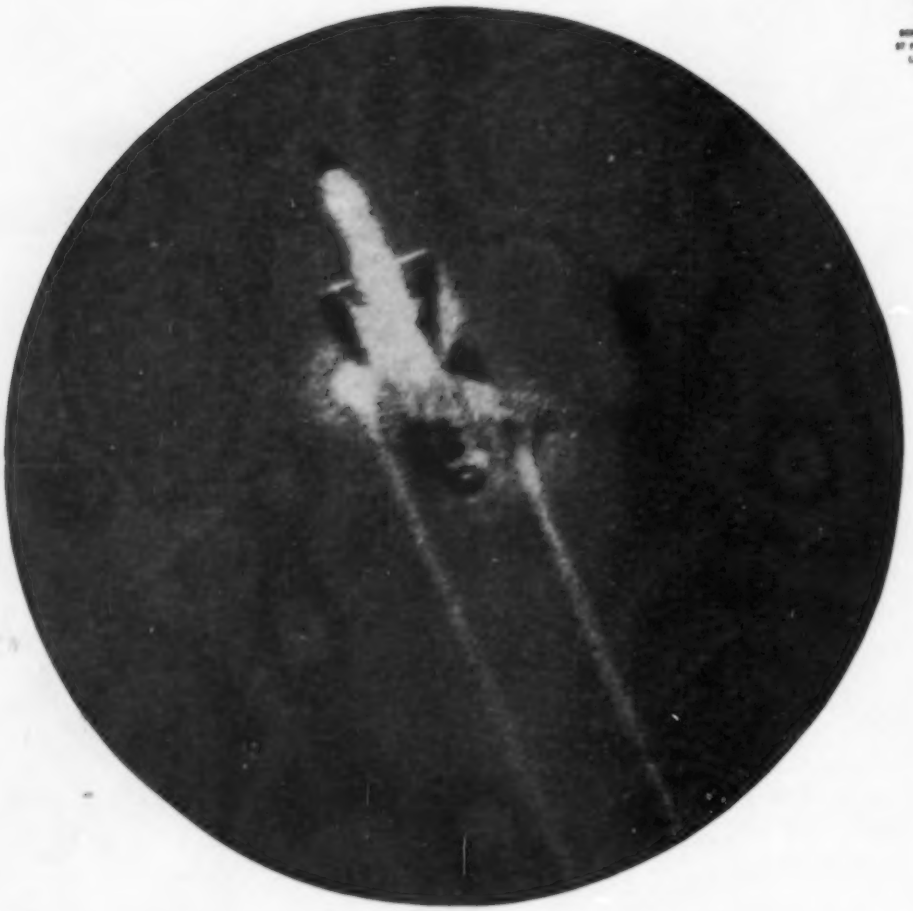

MINDS OF THEIR OWN

Today we have to make plans for defence against aircraft that fly faster than sound and far higher than the eye can see. How is it to be done?

To be successful under these conditions a defending aircraft with a human pilot would need to possess the climbing speed of an anti-aircraft shell, combined with a rate of manoeuvre that would make a man unconscious in a few seconds. Even if he could remain conscious, the pilot would need the eyesight of a radar set and the calculating speed of an electronic computer to work out an intercepting course.

Alternatively, an anti-aircraft shell would have small success unless it contained the pilot's ability to see and to think, and the aircraft's ability to turn, twist and chase.

In this dilemma was born the idea of the Guided Missile, a method of defence that is part shell, part aircraft, with more than human eyesight and computing power, but without human frailty under violent stress.

The development of such a weapon and the whole defensive system associated with it poses enormous problems. In this work the ENGLISH ELECTRIC Group — English Electric, Marconi's and Napier—are far advanced. This is not surprising, for their combined resources and experience are exactly those required for this difficult work.

The past achievements and present activities of the Group in the Guided Weapons field are considerable, but the national interest demands that they be kept secret. Much remains to be done in the future. How long it will take will depend largely on the efforts of the highly qualified men guiding the research and development teams. Some of these men have long been working on the problem; more must now be found. They will have heavy responsibilities, great opportunities and the finest equipment.

'ENGLISH ELECTRIC'

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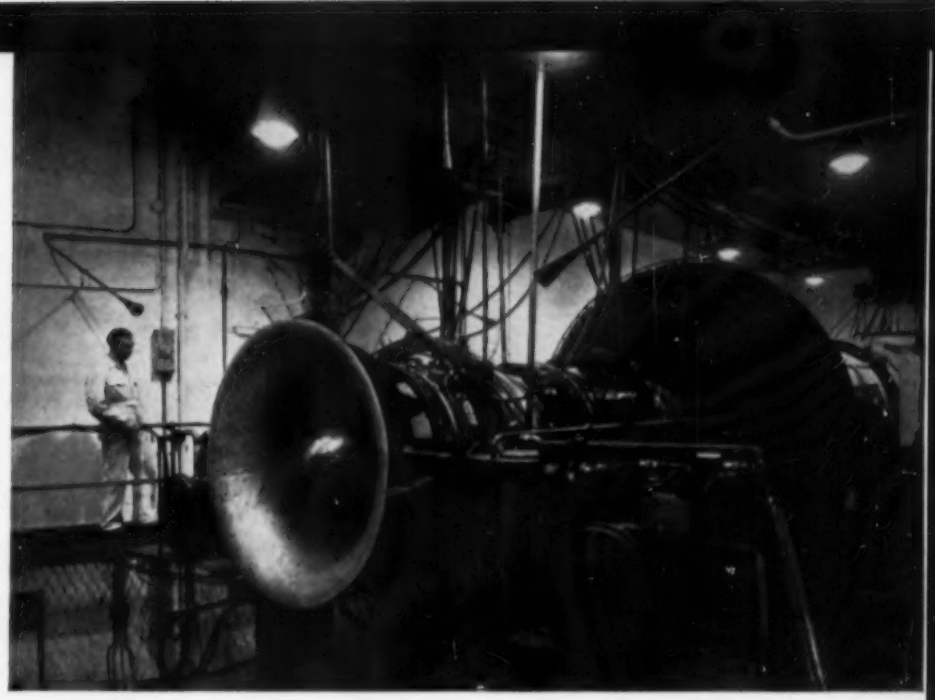
G.W.3

GYRON TEST-BED

de Havilland's New Turbojet Testing Facility at Hatfield



The Gyron on test is hung from the roof, and all pressure lines are taken up to the roof panels and thence to the control room. In the foreground is a centrifugal pump which will provide cooling air for shaft-driven accessories.

IN our issue dated September 9th we wrote something of the background and design thinking which led to the de Havilland Gyron. At present this engine is believed to be the most powerful type-tested turbojet in the world, the initial 150-hr rating being 15,000 lb (6,810 kg) static thrust. Engines of this calibre require test equipment of comparable stature, and—even without taking into account the need to test at high supersonic speeds and altitudes—basic bench running of the Gyron has necessitated the construction of a new, and exceptionally large, test bed.

As already reported, the first prototype Gyron ran for the first time on Sunday, January 4th, 1953. The engine was run on an open bed (i.e., with free intake and exhaust) which had previously been used for datum-calibrations with the Goblin and Ghost. This bed is still used for particular Gyron runs of relatively short duration. The building pictured on these pages has now taken over all the endurance running of the Gyron, and is also far better equipped with general test instrumentation.

Work on the new structure began on January 11th, 1954, some demolition of previous test cells being required in order to clear the site. The bed is situated among many other facilities on the north side of Hatfield aerodrome.

It was back in the early 1930s that a small installation was built on Hatfield's north side for testing airscrews on Gipsy engines. From this tiny nucleus has arisen a great spread of buildings, some of which include: the gas dynamics laboratory (Engine Company); production beds for Ghosts and Goblins (Engine Company); rocket test beds (Engine Company); flight section (Engine Company); development testing (all engines); guided-weapons buildings and g.w. flight section (Propeller Company); flight test section (Propeller Company); design and development (Propeller Company); test beds (Propeller Company); low-speed tunnel (Aircraft Company); high-speed turbojet-driven tunnel (Aircraft Company); and fatigue-testing tank (Aircraft Company). The new Gyron bed has been installed on the north-west side of the colony, exhausting towards open fields.

Like most other testing facilities of the de Havilland Enterprise, the bed was designed by the D.H. company needing it: in this case it was the de Havilland Engine Company's Plant Department, working to precise specifications laid down by the Gyron design and performance engineers. The overall layout chosen is illustrated by our drawing; the accompanying description traces the passage of a Gyron into the bed, and then follows the flow of air and exhaust from one end of the bed to the other.

Incidentally, this latter factor (the flow through the bed) becomes of great importance when testing a turbojet with so enormous a mass flow. It is sometimes difficult to prevent some of the hot gas from the outlet finding its way round to the intake and being put through the bed a second time. Were this to occur on the Gyron bed, a difference of 1 deg C in the mean intake temperature corresponds to a loss or gain of 100 lb thrust at maximum r.p.m. Actually, de Havilland are particularly happy about the Gyron building in this respect; all the flow goes through cleanly in one direction, and the efflux is upturned and rises high into the sky, there being practically no re-entrainment in any condition of wind.

Gyrons from Leavesden are prepared for test in an *ad hoc* building opposite the entrance to the test facility. Each engine is inspected, equipped with an intake bell-mouth, thermocouples, pitot combs and similar sensing devices, and mounted on a pair of large "horse collar" rings resting on rollers (for tilting the engine) on a trolley. The latter runs on a railway which passes through the large doors in the centre of the main intake in the test house.

When the trolley reaches the installation point in the cell it is resting on a garage-type hydraulic/pneumatic lift, which raises the Gyron some six feet until it is picked up by four ties hanging from the roof of the cell. The latter are then attached to the "horse collars" and take all the weight of the engine, the rear pair of ties being hung from a single, central roof anchor in order to provide three-point mounting. The engine is constrained longitudinally by locating itself lightly against thrust pads, described below. In addition, four strong safety trunnions are provided which could, in emergency, accept any out-of-balance loads resulting from a major mechanical failure, although normally the snubbers do not touch the engine feet at all, and permit some quarter-inch of free play in any direction.

With the lift down and the trolley removed the whole floor is clear and tidy; this is one of the first British beds to enjoy such a layout (although Fords at E. Wacker Drive, Chicago, employ such beds on J57 production). Fuel comes in from four cylindrical tanks holding over 50,000 Imperial gallons (backed-up by 100,000 gal underground), through a low-pressure pump controlled by constant-pressure valves. A large induction motor drives three pumps, to provide a maximum delivery exceeding 10,000 gal/hr for a Gyron with afterburner. Various types of fuel can be used, that in the storage tanks being filtered to 3 microns, and a 1-micron filter being inserted in engine-delivery piping. Finally the fuel is put through a fireproof hose coupled to the pair of Lucas D-type pumps under the Gyron compressor casing.

Above the engine are two large panels carrying more than 400 transmitter pipes for pressure readings, of which the majority lead to banks of vertical manometer tubes in the control room. Higher pressures, however, are read from bourdon gauges with 10in full-scale faces. Alongside the engine is an electrical panel through which are made 150 test connections; thus, over 500 readings can be recorded simultaneously. In addition, there are several electronic direct-reading multi-channel instruments and a number of electronic chart recorders.

The overhead runs of the various test lines not only keeps everything clear of the floor (where, in addition to causing annoyance, the piping could be damaged), but also prevents the formation of local U-tubes or condensation, which have, in the past led to erroneous readings. All pressure and temperature connections are numbered, and an engine can be brought into the bed in the morning and be running after lunch. Additional test gear is already in place to measure the behaviour of mechanically driven accessory drive boxes, for which cooling-air pumps are also provided.

Both thrust pads are of the Macklow-Smith type, employing sealed capsules and capillaries, the total longitudinal movement of the engine being only a few thousandths of an inch between idling (at little over 2,000 lb thrust) and full power. There are separate indicators for each pad, and each reads double the thrust actually transmitted. Thus, the total is half the sum of the reading of the two thrustmeters. (Legend has it that, during a visit to

Largest outlet silencers in Britain, the twin Mk 6 Detuners never get hotter than 150 deg C. The only obvious indication of running is the shimmering effluent, aural indications being insignificant.

GYRON TEST-BED . . .

the original open bed, a visitor was singularly unimpressed by seeing a pair of thrustmeters each reading 7,500 lb, and refused to believe that the true reading was the sum. The late Major Halford is reported to have ordered the present arrangement to prevent a repetition of such an occurrence.)

The control room is a model of cleanliness, ordered layout and reasonable working space. As the drawing shows, it has been designed to permit a second bed—a mirror-image of the first—to be built alongside, the manometers for this bed being already in position. From the outset it has been the aim to incorporate everything that could possibly be required now, or at any future date. From the control station the engine is clearly visible through large windows, it being possible to see exactly what is going on in the cell and to check for even the slightest leak. As a safety precaution the windows have two layers of ¼in armour glass and one 2in layer, and a ring of ¼in boiler plate surrounds the Gyron turbine section.

Air for the Gyron is drawn in through an enormous intake through which flow velocity is never sufficient to draw in much extraneous material (there is a wire fence about five feet high), although leaves from surrounding trees do get picked up. The vertical splitters are of a new, hexagonal form, which tune out a greater range of frequencies than the conventional pattern. Even at full power (at current ratings) the depression inside the cell does not exceed one inch of water, and disturbance to the numerous pipes and wires is trivial. For every pound of air passing through the Gyron, just under 1½ lb is entrained by the bell-mouth cooling intake behind the propelling nozzle. This results in metal temperatures being incredibly low; in fact, the window in the outlet duct (for looking up the jetpipe of the engine itself) has a Perspex window.

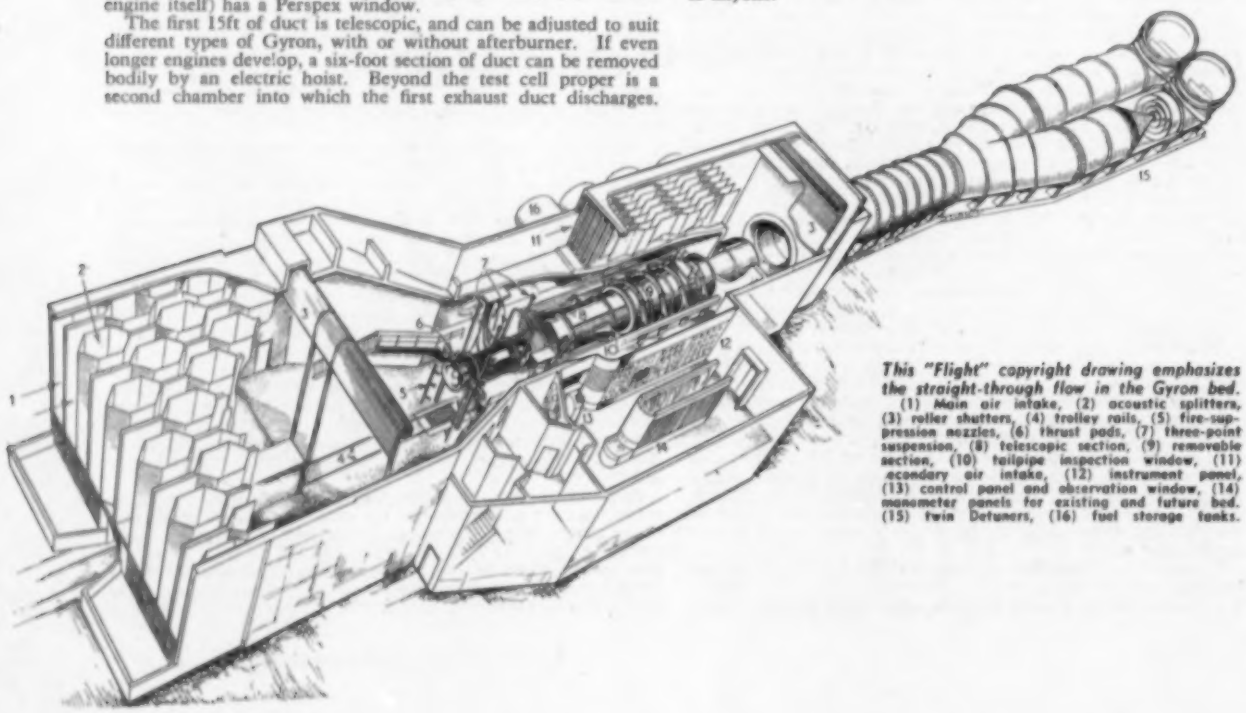
The first 15ft of duct is telescopic, and can be adjusted to suit different types of Gyron, with or without afterburner. If even longer engines develop, a six-foot section of duct can be removed bodily by an electric hoist. Beyond the test cell proper is a second chamber into which the first exhaust duct discharges. The latter points into the entry of the outlet silencer, and entrains a further mass of air (just over 150 per cent of the engine mass flow) through a roof intake and splitter panels. Thus, the two-stage air entrainment, with a 3 : 1 ratio over the engine flow, keeps the outlet ducting cool enough for it to be touched, and it is certain that no water cooling will be needed even with a 30,000 lb-thrust Gyron with afterburner. No stainless steel is used anywhere in the outlet ducting.

From the secondary cell there leads a diffuser, a parallel section, a breeches-piece dividing the flow into two and, finally, a pair of Cullum Mk 6 Detuners with upturned outlets. The Mk 6 is a well-known unit, and the use of a pair has made possible the accommodation of what may be the greatest flow of hot gas yet handled anywhere without having to develop a new Detuner. Each Detuner is anchored near the bifurcation, and expands fore and aft from this point, each section being roller-mounted on steel plates carried upon brick walls. Detuners were described in our issue of September 5th, 1952; an associated company, H. J. W. Cullum and Co., Ltd., provided sound-proofing throughout the Gyron bed, and—having experience of over 30 turbojet test installations in several countries—we consider the Gyron facility the quietest yet, in spite of the massive throughput. The latter may, in fact, tend to reduce apparent noise, owing to a reduction in mean frequency of sound.

Precautions against fire are naturally comprehensive. The entire test cell is continuously exhausted by two large fans mounted at the base of the Detuner silencing duct. These fans extract air from the cell through individual ducts, and remove all dangerous fumes which might result from the starting cycle or from broken piping. Spilt fluids are run off into an anti-flash sump and thence to a drain outside the building. In addition to various hand extinguishers there is an elaborate and automatically controlled extinguishing system.

In the event of fire breaking out in the test cell, the operation of a single switch on the main control console causes the fuel pump (low-pressure) to be shut off and the main fuel inlet valve to be closed. At the same time, the extractor fans are switched off and heavy steel roller shutters are run down over the main air intake to the bed. A second shutter can be run down across the entry to the outlet silencer. While all this is going on, the fire is kept in check by the discharge of a primary shot of carbon dioxide from nozzles around the engine (some of which are visible in the heading photograph). When the test cell is sealed off, a second (and larger) CO_2 discharge is made, sufficient to flood the cell completely. In the highly unlikely event of a fire still persisting after this treatment, a manual switch can release a third, very large, volume of CO_2.

As it is at present, the Gyron test facility has cost something of the order of £140,000, all of which has been paid by the de Havilland Enterprise. Chief contractors, in addition to Detuners, Ltd., and Cullums, have been such firms as Minneapolis-Honeywell-Brown, Barnet Instruments, Rotameter, Rellumit and Tannoy. A Gyron first went on test in the bed in May of this year, and it is now in use day and night, without any disturbance to anyone.



This "Flight" copyright drawing emphasizes the straight-through flow in the Gyron bed. (1) Main air intake, (2) acoustic splitters, (3) roller shutters, (4) trolley rails, (5) fire-suppression nozzles, (6) thrust pads, (7) three-point suspension, (8) telescopic section, (9) removable section, (10) tailpipe inspection window, (11) secondary air intake, (12) instrument panel, (13) control panel and observation window, (14) manometer panels for existing and future bed. (15) twin Detuners, (16) fuel storage tanks.

IN MEMORY OF DR. PLESMAN

Tributes at first Memorial Lecture

AT Delft in the Netherlands last week, Mr. J. D. Pearson, J.P., Wh.Sc., B.Sc., M.I.Mech.E., A.F.R.Ae.S., M.I.P.E., managing director of the aero engine division of Rolls-Royce, delivered the first Dr. Albert Plesman Memorial Lecture. Entitled *The Development and Future of Turbine Engines for Civil Aircraft*, Mr. Pearson's paper was summarized in *Flight* last week.

The attendance at the wind-tunnel building of the Aeronautics Section of the Technological University of Delft appeared to us to be a little disappointing in numbers. Nevertheless, several countries were well represented on this important occasion, particularly Great Britain and America. The presence of Prince Bernhard of the Netherlands, whose keen practical interest in aviation is known to everyone, added much to the occasion.

The Memorial Lectures are sponsored by the International Air Transport Association, whose director-general, Sir William Hildred, C.B., O.B.E., prefaced the lecture with some personal recollections of Dr. Plesman and his work.

The proceedings opened with an address of welcome by Dr. C. H. van der Leeuw, president of the Technological University, who spoke of the honour of having Prince Bernhard present, and referred also to the guest of honour, Mrs. Plesman—"to whom we pay tribute for the important share she has had in Dr. Plesman's activities and for the personal sacrifices she has made for aviation." Dr. van der Leeuw then asked Sir William Hildred to introduce the lecture series.

Sir William said that it had been remarked that whilst there were over two thousand million people in the world at any given time, there were not more than fifty thousand who really ran it. It would probably remain true that the world would continue to be run by a handful of creative thinkers and the inert mass would follow. In this sense, all the really influential people were essentially imaginative, intelligent and creative.

It had also been said—and history to some extent confirmed it—that the best breeding-ground for great men was a small and compact community. Holland was a case in point. It was a small country with an imperishable record in the arts and sciences, in maritime tradition, in its roster of great thinkers, in the courage of its people, and in its way of life, which was admirable and deeply satisfying. In the new art of flying, it was not surprising that Holland produced her great man—great in the hearts of his own people, great in thought and action, great in the memories of many hundreds of his international friends.

Albert Plesman was born not far from Delft on September 7th, 1889, without a silver spoon in his mouth—or without advantages. He joined the Fifth Infantry Regiment of his country in 1911—44 years ago—and at that point he made his first acquaintance with flying. From then until the night he died [New Year's eve, 1953] flying was in his blood, and he enriched it with every thought and action.

He obtained his wings in November 1918, at the time of the Armistice. He had seen something of aviation as a destructive mechanism; now he said "this flying, which was a hell, can become a heaven"; and then he made his real start by organizing, in August 1919, the first aviation exhibition in Holland, which aroused tremendous interest. That exposition converted his country to be as thoroughly air-minded as over the centuries it had been sea-minded, and the interest it aroused helped to facilitate the formation of K.L.M. Royal Dutch Airlines on October 7th, 1919. From the very start his ability, insight, energy, common sense and personal strength took K.L.M. into a leading position in the world of international aviation. It did not trouble Plesman that Holland, with her small population and domestic preoccupations, could not in the nature of things be a great traffic-generating country. But he knew his people; he knew their mettle; he knew they could be good fliers. He followed his star, and he made K.L.M. great.

Today K.L.M., which started with 12 people in 1919, had over 13,000 employees, operated routes all over the word totalling 150,000 miles, penetrated into 67 countries, and linked a hundred cities with a modern fleet of about a hundred first-class aircraft. Plesman always had a roving eye for a good aeroplane and his judgment in seeing ahead was never at fault.

Coming nearer to the question of his contacts with and influence upon the International Air Transport Association, one remembered that he was one of the 12 men who met at The Hague under the chairmanship of Sir Sefton Brancker on August 25th, 1919, and who formed the Association. An agreement was signed that afternoon by five of them, with K.L.M. signing up almost immediately. The Dutch company was actually in process of being formed at the very moment when the old I.A.T.A. was being formed. The latter was established—if, said Sir William, he might quote from the signed agreement—"with a view to co-operate to mutual advantage in preparing and organizing international aerial traffic." From that day to the date of his death, Plesman was active in every phase of the Association's work, both as K.L.M.'s main spokesman and as president in 1929 and 1934.

Though saturated in his job and dedicated to the world of air transport, Plesman had another fountain of inspiration and comfort; that was his church and his religion. He had time for contemplation during the Second World War, and during that period he worked out a plan for international co-operation based on his theory and practice that the ocean of the air united all people and that every man could benefit from the goodwill and help of every other man. As a practical idealist, his project of international co-operation with the objective of executing great technical projects for the benefit of mankind, was perhaps as significant a facet of the man as his indomitable energy and vision in creating his international airline. Sir William knew no one who did not regard him with deep respect and close affection. Another endearing characteristic was the simplicity of his family life. He lived quietly, loving his family, bearing with Christian fortitude the tragic loss of two fine sons in the cause of aviation.

Sir William Hildred concluded his introduction by relating how I.A.T.A.'s executive committee came to decide upon the lecture series as the most fitting form of memorial.

After Mr. Pearson had delivered his paper, a vote of thanks was proposed by Dr. H. J. van der Maas, chairman of the Aeronautics Section of the University, who said that the lecturer had established beyond doubt that the propeller turbine would be the main source of power of most categories of civil aircraft for a number of years to come, and that it would contribute towards faster and more economic air transportation on a basis of increasing safety, the ideal which Dr. Plesman always advocated.

COMMONWEALTH SURVEY OFFICERS' CONFERENCE

THE 1955 Commonwealth Survey Officers' Conference took place recently at the Department of Geography, Cambridge University, under the presidency of Brigadier M. Hotine, C.M.G., C.B.E., Director of Colonial Surveys.

Some 240 delegates and observers attended (the latter including representatives of U.S.A., the Netherlands, France, Belgium and Eire) from Government survey and technical establishments and from commercial survey organizations and instrument manufacturers. An exhibition of survey equipment included photographic and photogrammetric instruments used in air survey.

The principal business of the Conference entailed the discussion of a number of technical papers previously distributed and covering a wide range of subjects in the fields of land, air and hydrographic surveying. Among the papers concerned with air survey were the following:—

The Thompson-Watts Plotting Machine, by Professor E. H. Thompson, O.B.E., University College, London. *The Williamson Plotter Type L.S.P.*, by Mr. J. E. Odle, Williamson Manufacturing Co., Ltd. *Radio Aids to Surveying*, by Mr. C. Powell, Decca Navigator Co., Ltd. *Modern Survey Methods as Adapted to Canadian Conditions*, by Mr. W. H. Miller, Director of Surveys and Mapping Branch, Department of Mines and Technical Surveys, Ottawa, Canada. *An Aerial Survey Operation Overseas*, by Mr. W. P. Smith, M.B.E., Air Survey Co., Ltd. *Aerial Photography in Nigeria*, by Mr. H. A. Stamers Smith, Director of Federal Surveys, Nigeria. *Mapping with Multiplex Equipment from High Altitude Photography*, by Maj. I. E. Sleep, R.E., No. 1 Survey Production Centre, R.E. *The Provision of Photogrammetric Control for Large Scale Surveys of Great Britain*, by Lt.-Col. B. St.G. Irwin, R.E., Ordnance Survey. *The Use of Plotting Machines for 1:1250 Air Survey*, by Maj. D. V. Hutchinson, M.B.E., R.E., Ordnance Survey. *Aerial Photography and Resources Surveys*, by Mr. T. D. Weatherhead, O.B.E., and Mr. V. C. Robertson, Hunting Aerosurveys, Ltd.

Il-28

A Closer Look at the Russian Counterpart to the Canberra

***THESE** first clear pictures of the Soviet - designed Il-28 twin-jet bomber, as built in Czechoslovakia for the Czech Air Force, were released in connection with the Czech Air Force Day celebrations on September 4th. (The Rumanian Air Force celebrated on the same day.) The Il-28 has been used by the Soviet Air Force for several years. Unlike its British equivalent the Canberra, it carries defensive (and, in some cases, as on the left, offensive) armament.*

THE AERONAUTICAL BOOKSHELF

"Anthropometry and Human Engineering." Agardograph 5. Published on behalf of the Advisory Group for Aeronautical Research and Development, NATO, by Butterworths Scientific Publications, 88 Kingsway, London, W.C.2. Illustrated. Price £1 1s.

TEN papers were delivered at an A.G.A.R.D. Aeromedical Panel symposium at Scheveningen, Holland, in May 1954, and in this book they have been collected together, and published complete with the discussions which ensued. The topics discussed were mainly in connection with measurements of pilots and the desired dimensions for their various work-spaces in aircraft, and the types of instrument presentation and layout which were required for modern operational flying. One notes that three of the sources of information quoted in the paper on *Human Factors in Aircraft Design* are given as *Flight;* and that two of the diagrams of an instrumentation system proposed by Mr. O. W. Neumark were also originally published in *Flight*.

Some of the papers deal with performance in subsequent training and operational flying of certain psychological types identified during pre-acceptance assessment in various countries.

"The Comet Riddle" by Timothy Hewat and W. A. Waterton. Frederick Muller, Ltd., 110 Fleet Street, London, E.C.4. Price 10s 6d.

LAST year's investigation into the accidents to Comets G-ALYP and G-ALYY was rightly described at the time by Sir Lionel Heald as "a most remarkable piece of scientific detective work." It was an even more remarkable gift to journalists and writers in general. Many thousands of words appearing in the national Press at that time reported, interpreted —and at times distorted—the evidence of the Inquiry; and more than one publisher prepared to produce a book telling the full Comet story.

The first of those to appear, written by an Australian journalist in collaboration with the air correspondent of the *Daily Express*, is a popular account of the history of the de Havilland Comet up to the implications of Lord Cohen's report of the Inquiry. Inevitably, there is much over-simplification; not so inevitably, there are factual errors, mis-spellings, and phrases like "knots per hour." There are passages to offend the aeronautical purist, and some others, in Chapter 9, which may strike *Flight* readers as vaguely familiar.

These faults are relatively minor, however, for the picture which the authors build up of the Comet investigation is basically sound. The drama of the whole story is conveyed well, at the expense of over-emphasizing general-interest aspects having little significance.

Many interested people, at the time of the Inquiry, found difficulty in obtaining a clear overall view of the evidence being presented. This was due both to the sheer volume of this evidence and to the manner in which newspapers like Mr. Waterton's tended to deal with it. While this book will not satisfy those desiring full technical details—nor is it "the full story of the Comet" as the dust-jacket blurb claims—it does give a readable, condensed account of the historical background of the Comet and of the fascinating story of the Farnborough investigation. The full story will take more than 160 pages of anyone's writing; in the meantime, *The Comet Riddle* is a fair digest of the facts.

"Who's Who in World Aviation," American Aviation Publications, Inc., 17 Drayton Road, Boreham Wood, Herts. Price £3 11s 6d.

DESIGNED "to fill the need for information about the living men and women contributing to aviation's dynamic development," this volume should be useful to members of the aircraft industry and, in particular, those who conduct foreign business. It is an American publication, and lists over 2,000 biographies of industrial, Service and other personnel in all parts of the world. Not surprisingly, perhaps, American entries considerably outnumber those for the rest of the world together.

"The Dunlop Guide to Great Britain" (11th edition). Published for Dunlop Rubber Co. by Ed. J. Burrow and Co., Ltd., Cheltenham. Illustrated. Price 7s 6d.

MEMBERS of the industry who have cause to make business journeys to various parts of the country will find this well-known publication an invaluable companion, ready to provide information about routes, hotels and many other things. This new edition, which contains 24 coloured road maps, apart from numerous town plans, gives information on some 2,500 places. And, of course, the guide—remarkable value at its price—can be just as helpful to the driver on holiday.

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The Maxaret, developed by Dunlop, is a device that keeps braking power at a constant maximum (with pilot-control right up to skidding-point) and totally prevents wheel skidding and tyre scrubbing damage. It enables the operator to get more landings per tyre and offers the pilot and passengers added security in emergency. The small, compact Unit, weighing only 4.7 lb., fits any size of wheel and makes no additional demands on aircraft services. Full details of the Maxaret are available from the Dunlop Aviation Division.

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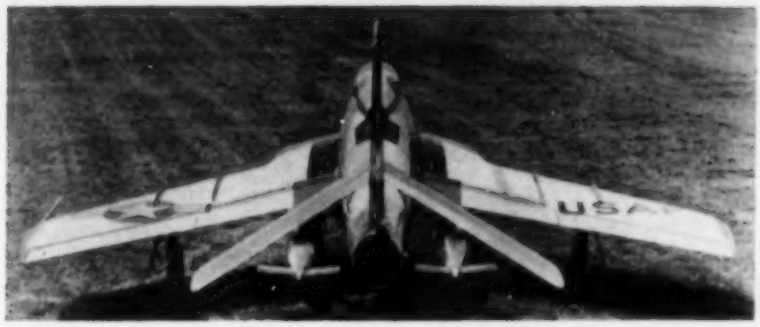


Photographed at Gatwick, this Valetta abounds with curious equipment, including radomes at each end of the fuselage. Below, the Republic RF-84F Thunderflash FICON reconnaissance machine displays its slab tailplane, which is not only swept back but also swept downwards. This permits the fuselage to be carried close beneath the GRB-36 "mother ship." In developing this tailplane the chief problems were not aerodynamic but structural. FICON units are now operational.

AIRCRAFT INTELLIGENCE

Great Britain

de Havilland Venom Exports. It is worth commenting on the fact that the Venezuelan Air Force, having operated Vampires for many years, are now re-equipping with a quantity of Venom F.B.4s. This mark of Venom has powered ailerons, and must be considerably more expensive than the F.B.1; yet the improved performance is obviously well worth the extra cost. Apart from the sale of J.34 Hunters to Sweden, this is the first type of powered-control military aircraft to be exported from Britain.

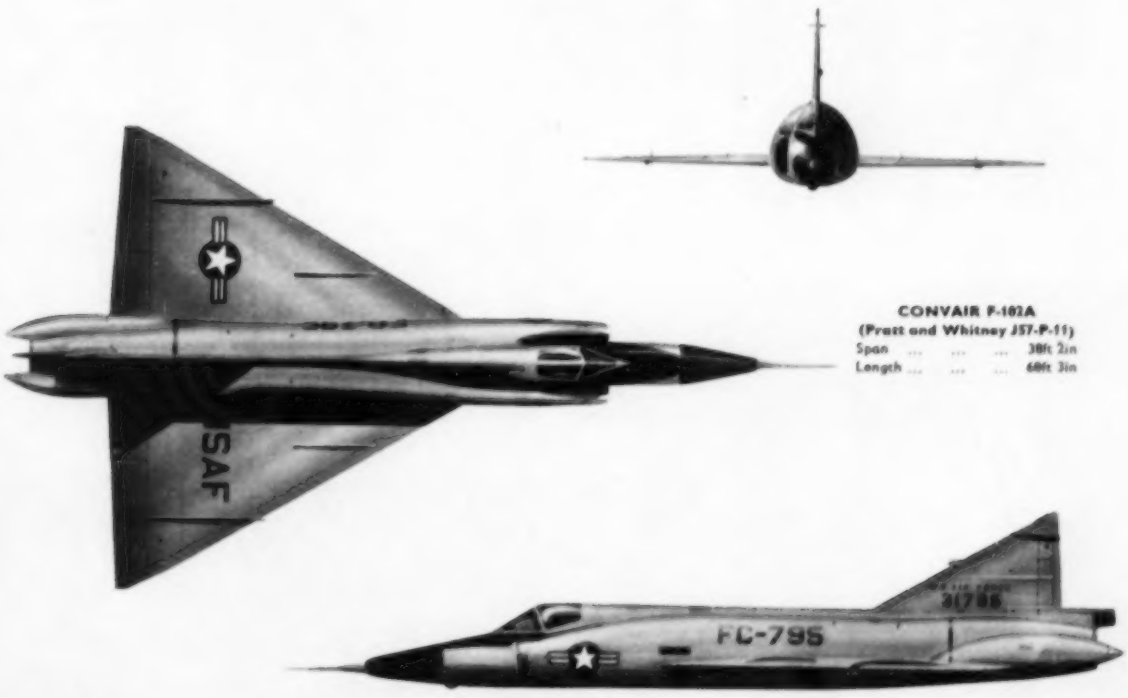
English Electric P.1. In our brief description last week we remarked on the fact that no air brakes were employed during the flying of the second prototype of Farnborough. In our original manuscript—shortened before going to press—we had suggested that such surfaces could readily be fitted on each side of the rear fuselage, flanking the jetpipes. Further examination of photographs now shows that air brakes are, in fact, fitted in this position. They do, to some extent, resemble the original brakes of the D.H.110, although they open laterally, instead of above and below.

Fairey Pressure-Jet Helicopters. We learn from the Fairey Aviation Company that all the flying so far completed on the Jet Gyrodyne has been done on one set of tip-jets; similarly, only one pair of tip-jets has been used on the Ultra-Light helicopter. As we reported in our S.B.A.C. issues, tip burning is used in both these aircraft in order to permit operation at greater weights, and to improve performance in warm weather. In cruising flight, the tip burning is shut off, and flight maintained on compressed air alone; in the case of the Jet Gyrodyne, forward thrust is provided by a pair of pusher propellers, and autorotative landings are possible.

U.S.A.

Chance Vought F8U-1 Crusader. Production F8Us will be named "Crusader" in service with the U.S. Navy. This supersonic carrier-based fighter has a curious form of "Coke-bottle" fuselage, there being a distinct waisting of the front section immediately behind the "beard" intake to the afterburning Pratt and Whitney J57. A very considerable quantity of fuel is carried above the intake duct, the huge fuselage having a length of some 58ft. Main units of the undercarriage flank the engine bay, thus leaving the thin wing uncompromised by having to accommodate anything but control units. Prototype testing, mainly in the hands of John Conrad, is going well. The F8U is one of the first machines designed to the N.A.C.A.'s "area rule", in which profiles are modified to produce a flow as near as possible to that of a minimum-transonic-drag body. Another such aircraft is, of course, that shown in the three-view drawing below. Meanwhile, we are wondering how an F8U will get down a carrier lift.

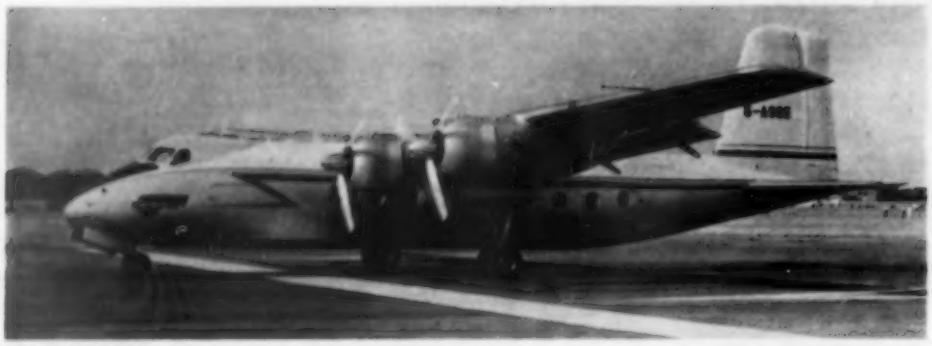
North American F-100C. The employment of white anti-flash paint on the underside of the fuselage of Strategic Air Command bombers is now being extended to include all U.S.A.F. machines with atomic capability. The Super Sabre is now in service in F-100C form, able to do radar bombing with A-weapons, and the holder (subject to ratification) of the world speed record is one of those finished in anti-flash paint. A picture appeared on p. 470 last week.



CONVAIR F-102A
(Pratt and Whitney J57-P-11)

Span	...	...	...	38ft 2in
Length	...	...	...	68ft 3in

A large single fin is the Herald's hallmark.



On the ground, the aircraft sits low on its Electro - Hydraulics undercarriage.

"Flight" photographs

BRITISH BRANCHLINER

FOUR salient features are attributed to the Herald "branchliner" by its makers, Handley Page, Ltd.: modernity, simplicity, robustness and efficiency. The aircraft was designed to operate on short and medium stages in all parts of the world, particular attention being paid to the requirements of airlines serving relatively undeveloped regions.

The fuselage, which is moderately pressurized to give a cabin altitude of 6,500ft at a cruising height of 15,000ft, is capable of carrying 44 passengers, five tons of freight, or varying combinations of passengers and cargo. Power units are four 870 h.p. Alvis Leonides Majors, driving 11ft de Havilland airscrews and giving a cruising speed of 200 m.p.h. on 50 per cent power. The high-wing arrangement was

The Herald's cockpit (above left) is designed for two-crew operation; B.O.A.C. and B.E.A. advised on layout. The pressurized cabin (lower left) will accommodate up to 44 forward- or aft-facing seats. The Alvis Leonides Major 870 h.p. radials have petal-type cowlings (right).

"Flight" photograph

Two pleasant in-flight studies of the prototype Herald in its Queensland Airlines colours. The wide-span Fowler-type flaps extend from the fuselage to the inboard ends of the ailerons.

New Ground and Air Views of the Handley Page Herald Prototype

adopted primarily to give ease of access for loading and maintenance, though good passenger view will also be an important feature of the aircraft.

All four engines are carried by the centre-section, which is of sandwich construction and is credited with excellent fatigue characteristics. Four bag-type tanks, holding 700 gallons of fuel, are accommodated within the centre-section, and provision is made for additional tankage of 300 gallons' capacity if required. With full tanks, the standard version of the Herald should have a range of 1,400 miles with 7,000 lb payload; the additional tankage increases the "full-tanks" range to just over 2,000 miles with nearly 4,700 lb payload. Range with capacity payload of 10,705 lb is 350 miles.

Take-off and landing distances vary, of course, according to loads, temperatures, altitudes and other factors. In general, however, it may be said that the Herald is designed for operation from 1,000 yd grass strips. Its gross weight is 34,000 lb.

Construction of the first Herald began last year, and orders for 29 aircraft had been announced before the first flight on August 25th, 1955. A second prototype is under construction and airline deliveries are due to begin late in 1957. The entire Herald project is a private venture by Handley Page; prototype construction was without benefit of Ministry of Supply contract. It is believed, however, that there is Service as well as civil interest in the Herald.

W. HOWARD JARVIS: The Night Scene — London Airport Central.

A Selection from the Society of Aviation Artists' Current Exhibition

AVIATION ON CANVAS

THE second exhibition of the Society of Aviation Artists was opened on September 13th by the President of the Royal Academy, Professor A. E. Richardson, at Guildhall Art Gallery, London, where it will remain on view until October 1st. The number of works displayed, nearly 150, is not greater than at the inaugural exhibition of June 1954, but the proportion of new pictures is higher; subjects and styles are more varied; and the quality of the exhibition as a whole is less dependent on the contributions of the better-known aeronautical artists. These observations, we hope, are endorsed by the small selection of exhibits reproduced on this page.

While the accent at this year's exhibition is primarily on the contemporary aviation scene, the wartime (1914-18 and 1939-45) and inter-war periods are not overlooked. The exhibition introduces to the public an important new narrative painting—*A Day in the Battle of Britain*, executed by Roy Nockolds for Fighter Command H.Q., where this vast canvas was first hung in April this year. Depicting an attack on a German bomber stream approaching London, it conveys well the sense of height and space, the mauvish-green tint of the earth from great altitudes, and the dull glint of diffused sunlight on the winding estuary.

Readers unable to visit the Guildhall exhibition may yet find opportunities of seeing many of the pictures. A selection from last year's exhibition has been shown in the municipal galleries of eight towns or cities, completing its tour recently in Aberdeen. A similar tour is planned for a selection of the 1955 exhibits.

Membership of the Society of Aviation Artists is not confined to painters; lay-membership, at a subscription of one guinea annually, is open to "all who are interested in promoting a greater appreciation of the artistic opportunities of flight and kindred subjects." Details may be obtained from the secretary, Mr. M. B. Bradshaw, at 23, Albemarle Street, London, W.1.

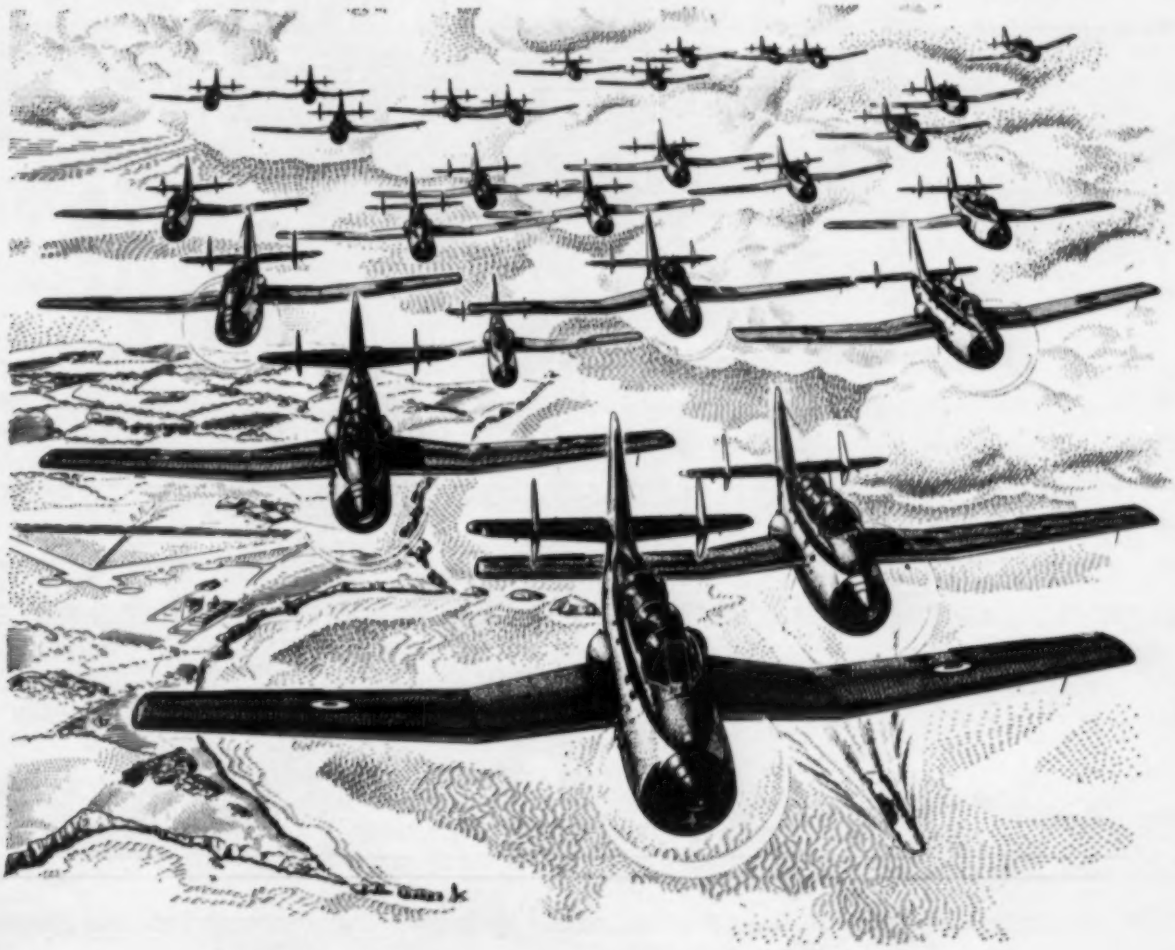
GEORGE AYLING: B.E.A. Helicopter Coming in to the South Bank Terminal.

CUTHBERT ORDE: World Gliding Championships, 1954.

GERALD D. COULSON: Marcel Dassault Super Mystère

DAVID SHEPHERD: Viscount of Capitol Airlines over Manhattan.

More Gannet Squadrons are forming according to plan



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- *Cleared for operation from Light Fleet and Fleet Carriers*
- *Shore-based suitability for coastal approach operations*
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- *Combines "Search and Strike" operational advantages with twin-engine reliability*

[ARMSTRONG SIDDELEY "DOUBLE MAMBA" TURBO-PROP ENGINE]

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(de Havilland Goblin engine)

The de Havilland Vampire Trainer has an outstanding advantage in economy because the student-pilot undertakes his weapons training on the aircraft on which he has already completed his advanced flying training, and with which he is, therefore, thoroughly familiar.

AUSTRALIA, BURMA, CHILE, EGYPT, FINLAND, GREAT BRITAIN (ROYAL AIR FORCE & ROYAL NAVY), INDIA, INDONESIA, IRAQ, LEBANON, NEW ZEALAND, NORWAY, PORTUGAL, SOUTH AFRICA, SOUTHERN RHODESIA, SWEDEN, SWITZERLAND, VENEZUELA.

Off to Philadelphia

—*for America's National Show*

Part II

BY THE ASSOCIATE EDITOR

With photographs by Harold G. Martin

Here being transferred from the Piasecki sheds to be placed on exhibition is the YH-16A turbine-powered helicopter—the largest, and also one of the fastest, in the world.

THE Air Force's 1¼-hr session (which had been washed out on Saturday, 3rd, in default of the decreed weather minima of 2,500ft ceiling and five miles visibility) was blasted open on Sunday by twelve F-86Fs of Air Training Command in low passes and rolls at about 600 m.p.h. When they were clear a pair of F-94Cs scrambled thunderously with afterburners raging, though even so, they took their time unsticking. Another F-94C made up a composite formation with an RC-121 radar picket, an F-86D and an F-89D (this to illustrate early-warning capability and intercepter types of Air Defense Command) and successive fly-bys by nine each of F-89Ds, F-86Ds and F-94Cs culminated in fan-outs and reheat climbs. The "94s" lit up almost at the instant of breaking, and the cutting-in of each afterburner smote the ear like a sonic boom.

Strategic Air Command contributed a JATO take-off by a vic of three F-84Fs, and Tactical Air Command laid on sixteen B-57s, in four waves, for a simulated airfield strike. On an actual mission they would have come boring in with 0.5in guns (eight apiece) and parafrag bombs, to be followed up by fighter/bombers with napalm, and at length by paratroops. Alas, what might

Two transports of outstanding merit now in production for the U.S.A.F.: Above, the Lockheed C-130A, and, below, the Fairchild-built Chase C-123B. The C-130A is powered by four Allison T56 turboprops; the C-123B by two P. and W. R-2800 piston engines.

Kaman HOK-1.

Piasecki H-25A Army Mule.

Piasecki H-21C Work-Horse.

Piasecki Work-Horse with inflatable pontoons.

Sikorsky H-34A.

Sikorsky XHR2S-1.

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have been a blood-stirring show by these American-built Canberras materialized as a languid, distant procession. Few people appeared to notice it.

From the same Command a section of two F-100s, for which a gross weight of 28,000 lb was announced, struck with imaginary napalm, cut in their reheat and returned individually. One afterburner sounded hesitant. The U.S.A.F., incidentally, consider the F-100 to be a greater improvement over the F-86 than was the F-86 over the P-51.

With nine F-84Fs, which had themselves strafed the airfield, milling above them, nine C-119s simulated a re-supply drop from 600ft (total drop-load five dummies), to be backed up by nine barn-like C-124s, likewise of Tactical Air Command, mightily massed.

In none of these demonstrations, however, was there the element of realism which had distinguished the Army's performance; nor was the offering of Strategic Air Command what I had hoped for. The FICON GRB-36/RF-84F which should have opened for this Command failed to materialize, but six "36s" in open formation, with F-84Fs flying top cover, passed over with their throbbing, baleful note. A B-47 JATO-d off at a flattish angle (the rockets reduce the unstick run by 2,000ft) and a second underwent a simulated flying-boom refuelling from a KC-97. Fifteen more, smoking heavily and in a formation something less than immaculate, succeeded in making an impression by passing over at about 1,000ft and 400 m.p.h. These, too, had an escort of twelve F-84Fs. The JATO demonstrator turned on its base leg, popped its approach 'chute miles away, to be followed, at touchdown, by the 32ft ribbon drag 'chute. It was explained that the first 'chute permits a "slower flying pattern" and enables the aircraft to "carry more power."

Far distant were approaching what I took to be three formations, but which materialized as individual B-52s (span 185ft) flying at some 500 m.p.h. and with thin smoke trailing from their batteries of J57s. All had wing tanks and white anti-atom bellies. (I learned at Philadelphia that the take-off speed of the B-52—now equipping the 93rd Bomb Wing at Castle Air Force Base, near Merced, California—is lower than that of the B-47, that acceleration is much the same, and that the 52 cruises faster and higher. Accommodation is such that "short walks" are possible for relaxation. Control forces are slightly heavier on the 52, but considerably lighter than on other machines of comparable size. They are, in any case, light enough to be handled with one hand on the approach. The pilot has no aerodynamic indication of when the bomb doors are open. The undercarriage can be used as a speed brake at high Mach numbers, and the spoilers can be operated symmetrically for additional braking effect. Transitional crews, however, learn to apply the brakes with care, especially at high speed and high altitude, as sharp pitching moments can be induced. The approach pattern can be flown closer on the 52 than on the 47, and the landing speed is lower. Advantages accrue from the use of the spoilers on the approach.)

More new equipment was to come: a C-130 with its Allison T56s pulling it along briskly though noisily; an F-101A strategic fighter which shocked with the blast of its reheat, though it was certainly higher than the announced 100ft; and, widely spaced, two F-102 all-weather intercepters, smoking and suddenly reheating for a climb at a rate and angle appropriate to their function. (Before the show I had seen what I took to be the same pair—temporarily based at McGuire A.F.B., New Jersey—rolling at approximately the rate of an F.D.1 or P.111.)

It remained for the Thunderbirds, the official Air Demonstration Team of the U.S.A.F., to raise the contribution of that Service above a pedestrian level.

The team was formed in May 1953 and its officially prescribed functions are: "(a) To exhibit the performance capabilities of front-line tactical fighter aircraft and the precision skill of the U.S.A.F. pilot; (b) to indoctrinate Air Force personnel by displaying the level of skill produced by the flying training program; (c) to demonstrate by formation acrobatics and flight maneuvers the precision necessary in actual fighter tactics; (d) to instill in all spectators a new concept of air power, and to interest qualified youth in the pursuit of a flying career."

Formerly on F-84Gs, the Thunderbirds have been equipped since March this year with the later, swept-wing F-84Fs. Their standard formation is a diamond, with the 84Fs five feet or so

apart and with the "slot-man's" cockpit about 3ft below the jet blast of the leader. The pilots are Capt. Jacksel M. Broughton, leader; Capt. W. L. "Bill" Creech, left wing-man; Lt. Billy J. Ellis, right wing-man; and Capt. Edwin D. Palmgren, "slot-man." Home base is Luke A.F.B., Phoenix, Arizona, where the near-perfect flying weather affords the maximum time for practice.

Between formation manœuvres individual pilots demonstrate the F-84F's performance more or less on the limits. A solo run at 100ft and 700 m.p.h. was, in fact, the curtain-raiser at Philadelphia, followed by six vertical rolls to 12,000ft. A pet manœuvre of the four-man team is the "whifferdill," a vertical U-turn wherein the formation repositions from diamond to line astern (or trail, as the Americans term it). They change, too, from diamond to line astern in a roll, from line astern to diamond in a loop, and make a 360-deg turn in 35 seconds, calling for a speed of some 600 m.p.h. and a sustained loading of 4½-5g. The path of some manœuvres is traced with smoke. At length, the '84Fs climb vertically and split to the cardinal points, returning in a vertical dive and pulling out to meet, more or less head-on, at minimum altitude and at a declared speed of 640 m.p.h.

With a view to "spotlighting the enlisted man" the Allison Trophy was put up this year for a quick engine-change by Lockheed T-33 ground crews from the Crew Training and Flying Training Commands. Each of six five-man crews had to detach the rear fuselage of a T-33, remove the Allison J33, instal a replacement, reinstate the tail and start up. Every move was scrutinized by an inspector (the sixth man of each team), and the winners—from Webb A.F.B., Texas—had their aeroplane back in business after 11 min 32.2 sec. Each man must have been a pound or two lighter at the end. With thirteen on the job, I understand, the sequence has been completed in 8½ min.

Attention was now directed to the 40,000-ton attack carrier U.S.S. *Ticonderoga* (the "Big T"), her upper works gleaming in the sun as she lay to the south of the field. Daily from 9 until 11.30 she had been at home to visitors—28,000 by the end of the show—and every afternoon she had a leading part to play in the Navy's flying programme. She roused herself from a siesta with a spasm of steam-catapult blasts, as two each of F7U-3M tailless fighters and S2F-1 twin-engined anti-submarine aircraft were successively punched out over the river at 140 m.p.h. With its propulsive force of 33 million ft-lb (the commentator gave his assurance) a vertically mounted steam catapult could project a family car 8,000ft into the air. Before I left America I was to see a number of cars which appeared to have undergone this treatment.

The F7Us built up the Mach with reheat and came in for a mock strike; then, with everything depressed, opened and lowered (except the nose, which reared grotesquely up in the air) each came dragging round the circuit at 7 kt above the stall. The first touched down like something out of *The Lost World*; the second was batted into the wires of Morest gear and stopped as willingly as a 16in shell. On the previous day I had seen one of these supersonic missile carriers (they are said to be able to launch "any modern weapon" at speeds in excess of Mach 1), pull a wire clean out, sending the attendant crew precipitously to earth and disconcerting one and all. The F7U's rate of climb, incidentally, was announced as 13,000 ft/min.

The S2Fs now came into the picture, with radomes lowered, MAD gear extended and searchlights winking. They climbed away at an angle quite unbecoming their matronly figures and three P2V-7s similarly conducted themselves under the urge of their Turbo-Compounds and under-wing Westinghouse jets. These knobbly, spiky sea lawyers, however, appeared almost medieval compared with one of the new A3Ds which introduced itself in a "dirty pass," then quickly cleaned itself up to return for a speed and climb demonstration worthy of the name Skywarrior. The weight of this carrier-borne attack bomber was announced as 70,000 lb.

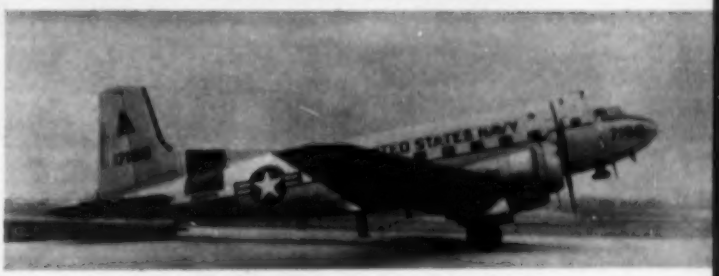
Meanwhile, the *Ticonderoga* had been shooting off more aeroplanes with impressive prodigality, for they were not, of course, landed back after each day's performance. There were two F2H twin-jet fighters and an AJ-2 atom bomber/tanker, the AJ having probe and drogue equipment by Flight Refuelling Inc., of Baltimore. I heard that the F2H squadron commander had had a bet with his admiral that a refuelling contact would be made in front of the stands, a feat often attempted but never achieved at previous shows. On the Saturday he lost his bet, but, in face of low-altitude turbulence on the following day, an F2H hitched up fair and square.

Three P5M-2 anti-submarine and patrol flying-boats (claimed to carry the most powerful tactical radar equipment found in any U.S. aircraft) sailed over winking with their searchlights; but whether in salute to the Land of the Free, or to all the nice girls who love a sailor, I could not make out.

One of the most edifying items on the Navy's programme was a parallel take-off by two Patuxent-based F9F-4s, one plain, the other with boundary layer control (B.L.C.) in the form of flap blowing. I gathered that take-off and approach speeds are reduced by anything up to 20 kt by this means, and that landing runs are,

Douglas A4D-1 Skyhawk lightweight attack bomber.

North American FJ-4 Fury carrier-borne fighter.



Douglas R4D-8 (Super DC-3) transport.

Republic F-84F Thunderstreak (one of the Thunderbird team).

Douglas AD-5 Skyraider carrier-borne multi-purpose aircraft.

Cessna L-19A Bird Dog, an A.O.P./liaison machine.

Bombs (2,000- and 1,000-pounders) on a Republic F-84F.

Rear armament (20 mm retractable turrets) of Convair RB-36E.

HVARs, Tiny Tim, and 20 mm guns on Douglas AD-5 Skyraider.

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of course, correspondingly shortened. Here is a scheme which really pays off, and one which is assured of increasingly wide applications on several classes of aircraft.

A dozen FJ-3 swept-wing carrier-borne fighters from Florida-based Fighting Squadron 61 beat up the field on a low-bombing strike to the accompaniment of impressive, though unconvincing, terrestrial explosions, and F9F-7s of the Reserve made their number before the Marines took over.

The Leathernecks (in common with the other Services) had their own spokesman to introduce them, and he declaimed in these terms:—

"Nearly 180 years ago, on November 10th, 1775, the United States Marine Corps was formed right here in the city of Philadelphia. Since then your Marine Corps has fought in every war. . . . In World War I the Marines, flying cumbersome de Havilland bombers, dropped a total of 52,000 lb on German submarine pens. In the Korean war they dropped 182 million lb. Marine pilots were the first to use dive-bombing techniques, during the Nicaraguan incident. . . .

"You remember the headlines as the Marine combined air/ground team took island after island across the Pacific. . . . They were back to join their Marine comrades in arms at Inchon, Seoul, Bunker Hill, the Hook and Vegas. The air/ground team made the difference; and here the Whirly Bird found a home. . . . Troop movements were a vital part of the Korean war, and on September 18th, 1951 (another first for Marine Aviation), a reinforced reconnaissance company of the First Marine Division relieved a force of South Korean soldiers on hill positions 884 and 854—by helicopter.

"Your Marine Corps would like to demonstrate some of the techniques of the air/ground team. Look to your left. You'll see units of Marine Fighting Squadron 114. The Marine Corps has come home. . . ."

Now, nine sleek, midnight-blue F9Fs swept over; but hear the spokesman again:—

"Supply from the air was part of the Marine Corps' operation in the Nicaraguan campaign of 1926, when the Corps was the first to supply its troops from the air, using the Trimotor Ford. Today the R4Q Flying Box Car, which you see in front of the stands, is a vital part of the air/ground team.

"During World War II the four-motor B-17 carried a bomb load of 8,000 lb and a crew of ten. The single-motor plane approaching is an AD-5 Skyraider. It carries a bomb load of 9,000 lb. . . .

"Here's another first for Marine Aviation. In the Korean war a Marine pilot, Major Bill Stratton, flying a Skyknight, made the first jet night fighter kill, using radar only. A Skyknight—the F3D—is flying before you right now.

"Here's an F2H-4 Banshee (Mr. Banjo we call him), a twin-jet all-weather fighter/attack plane, capable of delivery of atomic munitions and of intercepting in all weathers.

"Now the F9F-6P Cougar photo-plane, capable of aerial photography from 10-40,000ft; next the FJ-2 Fury, a day fighter in the 700 m.p.h. class . . . and here's the F9F-8 Cougar. . . .

"You've heard the expression, 'The Marines have landed . . . the situation is well in hand.' This is no idle claim. To land, take over and get established fast is the Marine plan in every operation. With this in mind the Marines have developed the structure you see approaching the field, towed by two HRS helicopters. We call it a geodesic dome shelter. A similar dome received awards in Italy and has been described as the one new architectural development. It is sturdy, light in weight, and, as you can see, transportable. It is suitable for all types of climates where a Marine might be called upon to fight. It will withstand winds of 150 m.p.h. and can be erected in just five hours. It makes possible the movement of entire units in minutes instead of days. . . .

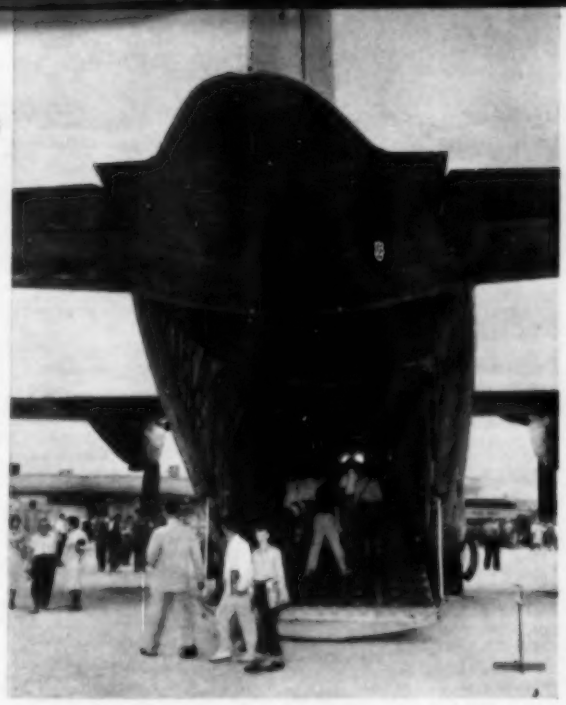
"The load that a helicopter can take off with is limited by power, altitude, temperature and terrain. To overcome these difficulties the Marines have equipped helicopters with rocket motors on the tips of the rotor blades, and when these are cut in they increase the lift capacity by 25 per cent. Of the two helicopters in front of the stands, one has ROR (rocket on rotor) and the other is standard. Notice the difference in the rate of climb. The whistling noise is the rocket motors.

"One of the most important phases of a Marine Corps landing assault is the establishment of runways for quick refuelling and rearmament. Usually the Marines try to take an existing field or, when this is not possible, they try to get enough real estate to build one. The equipment we demonstrate next is a mobile arresting gear, and with this it is possible to land jet aircraft on a 1,000ft field in the same way as we land them aboard a carrier. By using catapults or rockets for take-off it is possible to bring our striking force right into the laps of the enemy. We can also maintain a wide dispersement of fields in this way and offer a much smaller target to enemy bombers. We would like to demonstrate now how the gear operates by bringing two Marine jets on to a small landing strip. The first, an F2H-4, has just been launched from the *Ticonderoga*. . . . Now he begins his approach. He is picked up by the landing signals officer, who guides him into the wires of the Morest gear. . . .

"Next we show you how the Marine air/ground team strikes

Undercarriage and auxiliary tank of Douglas A4D-1 Skyhawk.

Undercarriage and air brakes of North American F-100A Super Sabre.



Beaver-tail stern and rear-loading facilities of Lockheed C-130A.

back at the enemy. Fifty miles out at sea the task force is approaching the target area. Marine ground troops have manned the assault helicopters. At two minutes before each hour the last strike against the objective arrives. Twelve FJ-3 Furies, manned by Navy pilots, make the last preparation strike as the assault helicopters come in. In the actual operation hundreds of helicopters would be employed, each one carrying six fully equipped combat Marines. The bunker you see is the initial objective for an assault squad. Since the helicopters are vulnerable both to ground fire and air attack they are provided with close cover and air support from Marine and Naval Reserve Squadrons flying F9F-7s and 8s. With the assault squad is a forward air controller—a Marine aviator who controls the air support from the ground. If, for example, our squad encounters intensive mortar fire, the forward air control calls the flight leader: 'Hello, Cougar, this is forward. Over. . . .' 'Forward, this is Cougar, go ahead. . . .' 'Cougar, we're in trouble, receiving heavy mortar fire . . . can't stand much more of it . . . appears to be coming from target grid 890-482-Z . . . give it all you have . . . soonest. . . .' 'This is Cougar. Have eight with rockets, one with bombs and one with napalm. Will hit 'em in that order.' 'This is forward. Let 'er rip.' 'Cougar leader starting run. . . .' 'This is Cougar one, on the way. . . .' 'Cougar two on the way. . . .'

" 'Hello, cougar, this is forward. You really cleaned those dirty birds out. Thanks.'

"Ground teams are now going into action with rockets, satchel charges and flame throwers, and the action is repeated all along the landing area. Helicopters return with supplies and more personnel. Soon the arrester gear is set up. Jets are brought into the landing area for fuel and ammunition; and whether it's a hot, cold or indifferent war, the Marines have landed. The situation is well in hand."

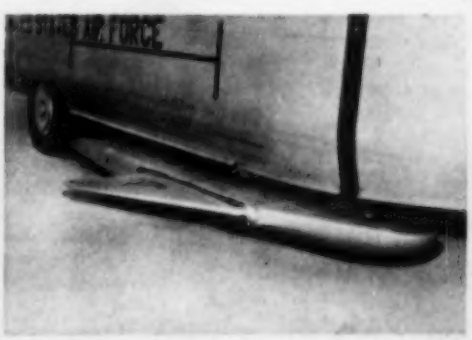
The assault helicopters engaged in this action were six HRSs of Marine Helicopter Squadron No. 1, Quantico, and the supporting Cougars (which laid on the most spirited strike of the whole meeting) were from a New York Reserve Squadron.

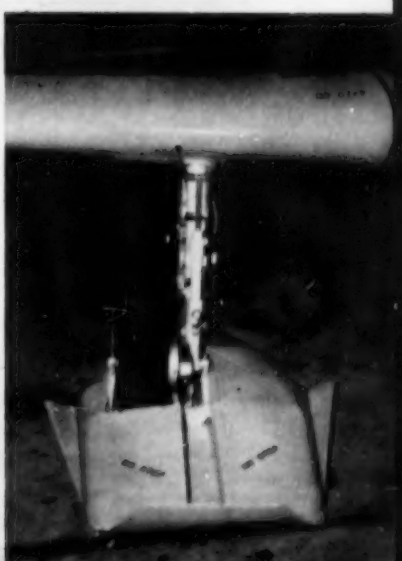
After the sound and fury of war it was a rest-cure, each day, to watch a Piper Apache, Aero Commander and Beech Twin Bonanza—all Lycoming-powered and proclaimed as the "safest offices over earth"—going about their business of sales promotion singly or as a circus. Their paint jobs were in the very highest,

Detail of Bell X-1A attached to XGB-29 air-launcher.

Loading door and troop seats in the Sikorsky H-34A helicopter.

(Above) Fairchild J44 installation on the Bell V.T.O.L. (Lower left) Inflatable pontoon and wheel undercarriage of Piasecki Work Horse. (Below) Ski of Stroukoff Pontobase C-123F. (Lower right) Water-skid of All American Bellanca Cruisemaster.





The Douglas Nike ground-to-air missile, as seen on the left, is already operational in the Philadelphia district and in other parts of America. On the right is the Hughes Falcon air-to-air missile.

The Martin TM-61 Matador, with booster, on its launching trailer.

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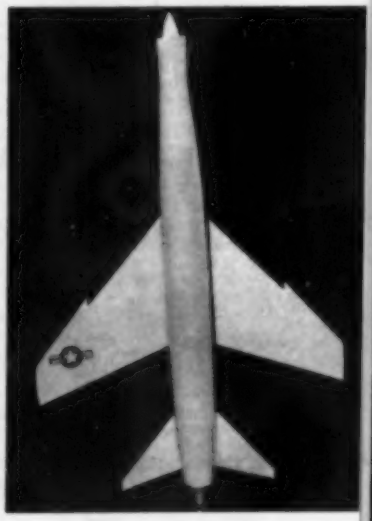
and loudest, American tradition. A Grumman Super Widgeon and a Royal Gull (the last being our old friend the Piaggio P.136L, licensed in America) appeared on the Lycoming demonstration list, though I did not see the Widgeon myself. The Gull was certainly there and looking so attractive that it was boarded by a party of enterprising teenagers, who flipped all the switches and succeeded in retracting the undercarriage.

The flying demonstrations of Sunday culminated with a galvanizing exposition by the Navy's Blue Angels, on F9F-8 Cougars. Like the F-84Fs of their rivals the Thunderbirds, these are specially furbished for demonstration flying, gun ports, for instance, being riveted over.

Two "maximum-performance" men first took the stage, flat out and from opposite directions, trailing red and blue smoke and whipping into rolls. Thereupon, in a tight diamond, came the team of four on their "feel-out pass," wherein they check for turbulence and generally take note of conditions and cloud. Having satisfied themselves, the big show gets on the road. The formation evolutions—some with smoke—included a change from right echelon to diamond and reverse echelon rolls, such manœuvres being interspersed with individual performances. Especially remarkable were "knife-edge runs," with the Cougars skating on their sides at something near top speed. One man reversed from one edge to the other. The team of four pulled round in turns at between 4 and 5g, and looped at a constant 4g. In every way their show was a marvel of precision and beauty—especially the high-explosive break-up, the sequence of which I have to confess utterly baffled me. (I was comforted to learn that there has been so much argument as to what really happens in this newly perfected manœuvre that a film has been made to settle the matter). Leader of the Blue Angels is Lt-Col. Zeke Cormier, and the other members are Lt. (J.G.) B. Gureck, Lt. N. Pierozzi, and Lt. (J.G.) K. Wallace.

After the flying show was over the announcer gave notice that the Bendix Trophy trans-continental speed dash was developing into a horse race. Two of the six F-100C Super Sabres were out, having blown tyres at refuelling stops, and the remaining four had been bucking headwinds. Certainly the times were disappointing. The winner, who was the first to land, although he had taken off second from George A.F.B., Victorville, California, was Colonel Carlos M. Talbott, and his speed for the 2,325-mile flight was 610.726 m.p.h. Colonel Talbott had stopped for five minutes to refuel at McConnell A.F.B., Wichita, and I noticed that his F-100 was the only one of the four to land with under-wing tanks in place. None of the machines carried guns; in fact the armament bays appeared to contain personal effects.

Headwinds ranging from 40-75 m.p.h. had, I gathered, been encountered all the way to Indianapolis, whereafter the wind was of some assistance. The pilots who landed after Colonel Talbott considered that they had been "short-changed" at their refuelling stops and Capt. Mooreman told me that he had coasted in from Harrisburg, so dire was his fuel situation. I saw him land downwind at what I supposed to be 180 m.p.h. The F-100Cs were from the 479th Fighter-Day Wing, George A.F.B., Cal., and the 450th Fighter-Day Wing, Foster A.F.B., Texas.



On the following day (when I was on my way home) the announcement was made at Philadelphia that an F-100C had given a more realistic demonstration of its performance by setting up the new world speed record of 822.135 m.p.h. over an 18-km course (this, of course, with reheat, the use of which was denied the Bendix racers). The pilot was Colonel Horace A. Hanes, and for his achievement he was presented with the Thompson Trophy at the Philadelphia show on September 5th.

Below is what is believed to be the first picture published of a squadron-service fighter equipped to carry guided missiles. It is a Chance Vought F7U-3M Cutlass and the missile carriers are seen on the outboard under-wing pylons. They are toed in at quite a sharp angle. At upper right is a model revealing—again for the first time—the fuselage configuration of the Cutlass's successor, the XF8U-1 Crusader. At lower right is a model of the Convair F-102A single-seat all-weather interceptor showing the peculiar wing-tip form.

U.S. ARMY

MY exploration of the static show began with the Army—a Service which is seeking to secure the independence of its air branch and advance its status. One of the means to this end (it was pointed out to me by that oracular observer/recorder Jim Fahey) had been the stencilling of white king-sized "Army" inscriptions on every machine in place of the former self-effacing legend.

There follow notes concerning a few of the aircraft, and some of the more notable static exhibits.

Piasecki H-21C Work Horse. A 15,000 lb, twin-rotor helicopter taking pilot, co-pilot, 12 stretcher patients and attendant, or crew and 20 troops. Declared speed was 110 knots, range 600 miles, and service ceiling over 20,000ft (considerably higher than generally quoted figures).

At the opening ceremony Mr. Charles C. Finucane, Under-Secretary of the Army, presented a citation to the 509th Army Helicopter Company of Fort Belvoir, Va.—equipped with H-21Cs—for their rescue and supply operations in the recent disastrous floods. In 189 hours' flying the Piaseckis evacuated 220 persons, lifted 45,570 lb of food, medical supplies and general cargo, and flew 13,160 miles over the stricken areas of Pennsylvania, Connecticut, Massachusetts and New York. Their work will continue through "Operation Noah," the Army's name for the Corps of Engineers' reclamation work in the flood areas.

Piasecki H-25A Army Mule. The Army regards this helicopter as an interim model for casualty evacuation, operational training and general utility. It takes the pilot, three stretcher cases and attendant, or pilot and 640 lb of cargo.

Sikorsky H-34A. This is the Army's version of the Sikorsky S-58, a scaled-up development of the S-55 powered by the Wright R-1820 Cyclone. A typical service load is 12-14 fully equipped troops or 3,000 lb of cargo.

Douglas Nike. Philadelphia itself is surrounded by Nike ground-to-air guided missile installations in various stages of completion, and the defences are already operational. Displayed by the locally based Battery "C" of the 506th A.A.A. Msl Battn (Launching Area, as distinct from the Integrated Fire Control area, I was told) was a Nike on its launcher, the latter labelled "System XSAM-A-7 Rail Launching." For our photograph the lieutenant in charge obligingly had the launcher raised to its firing position, at an 85-deg angle. Nike is about 20ft long and 2ft in diameter. Its present range of some 30 miles is being increased through Army research and development. Already it is considered "nearly infallible" against targets flying at levels up to 50,000ft. The Army declares that while most individuals desire their communities to be defended, some people think the Nikes should be located elsewhere than in their own backyards. Site location, however, is technically of first importance, and sites are being located and built accordingly.

Miscellaneous Army Exhibits. The Army Quartermaster Corps showed the 32ft nylon parachute now used by U.S. paratroopers, which permits jumps from aircraft flying at 175 m.p.h. When the user reaches the end of his 15ft static line the canvas pack containing the suspension lines and canopy is jerked off his back, and as he continues to fall the lines make their exit, followed by the canopy. This action takes place above his body and is claimed to reduce greatly the possibility of entanglement. Formerly the static line pulled off the cover of the parachute-pack, permitting the canopy to extend and then to pull out the suspension lines in close proximity to his body—a method responsible for many casualties, due to the opening shock, entanglement of suspension lines and damage to the canopy during its release. Jumpers, however, continue to wear a chest pack also, for emergency use.

Also on view was a 100ft cargo parachute for dropping such loads as a 75 mm pack howitzer, a jeep or supplies weighing up to 3,500 lb. Clusters of these 'chutes can deliver 105 mm howitzers, 2½-ton trucks, bulldozers, graders, or supplies weighing up to 21,000 lb.

Featured too were the experimental cardboard "cushions" which absorb the shock of loads dropped from heights up to 1,500ft without parachute. In recent tests at Fort Lee, Va., four of these absorbers were lashed to a 1,000 lb load dropped from 1,500ft. The supplies—tinned rations—were undamaged. A small (15ft) stabilizing 'chute kept the load upright to ensure landing on the protected under-side.

U.S.A.F.

Convair XC-99. An early morning visit was rewarded by a conducted tour of this, the world's largest landplane. The "O" prefixing its serial number—352436—signifies that the airframe is already more than ten years old, though the skin wrinkles are not attributable to this alone. The "99," I was reminded, provided valuable "State-side" cargo airlift for the Korean war, flying from Kelly A.F.B., San Antonio, Texas, to McClellan A.F.B., Calif., a run it maintains twice weekly to this day, operating as a unit of Headquarters Squadron 2851st Air Base Wing. By August 15th last it had 5,364½ hr in its log, and had lifted well over 46 million pounds for 961,794 miles. Fuel capacity is 21,000 U.S. gallons, and 400 combat equipped troops or 300 stretcher patients, with attendants, are feasible loads.

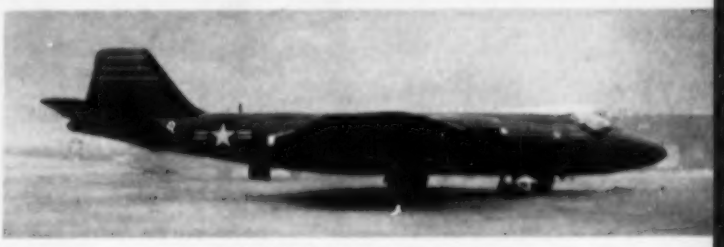
Viewed from the cockpit area the cleared top deck is like a well-lit tube tunnel. I was shown the famous electrically operated cargo hatches and hoists, the overhead rollers for handling cargo, and I peered into the engineers' compartments within the wing itself. One of the engineers told me that these roomy spaces are useful for replacing fuses and relays, rectifying undercarriage malfunctions, attending to "little fires," and so on. There is intercom. to the cockpit, but the engineers must be "mighty close" to each other to communicate orally between themselves.

A complete crew is made up of pilot, co-pilot, navigator, engineer, assistant engineer, crew chief and right and left scanners, but a duplicate crew is normal; and, this being so, there are two rest cabins and additional bunks on the main top deck. I was shown an ingenious and (one would judge) hygienic installation described as an electric toilet. This, I gathered, is a prototype model, but other comfort stations—effective, if more primitive—are laid on at strategic points. All crewmen have parachutes.

Piasecki YH-16A Transporter. With its twin Allison T38 turboprops, this 32,000 lb twin-rotor helicopter has a speed of over 150 m.p.h. I was told that it had made several flights in recent weeks. Statically parked at Philadelphia, it was among the most imposing sights of all. Capacity is 40 passengers or 32 stretcher patients, and the crew numbers three. The first YH-16, originally powered with Pratt and Whitney R-2180 piston engines, is now being fitted with Allison T56s.

North American F-86D. I was assured that there are more 86Ds in service than all other U.S. intercepters together. A North American news release mentions I.L.S., Lear autopilot,

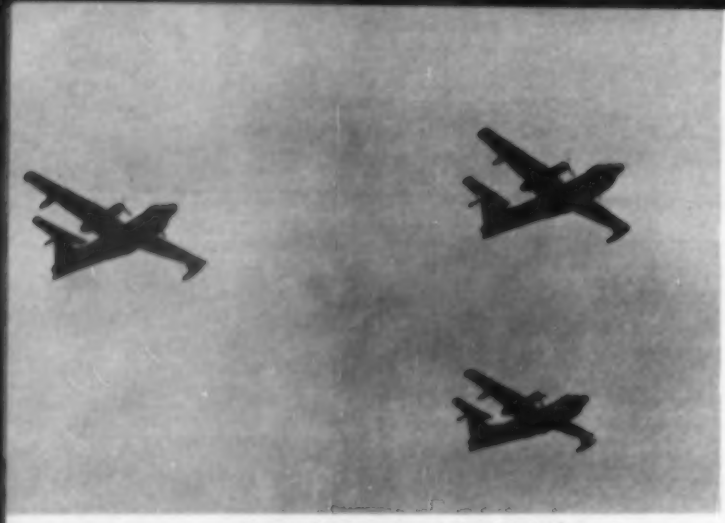
North American F-100A Super Sabre.



Martin RB-57A Canberra.

Lockheed P2V-7 Neptune.

Lockheed RC-121D.



Martin P5M-2 Marlins of the United States Navy.

OFF TO PHILADELPHIA . . .

automatic direction finder, and either an omni-range radio or Sperry Zero Reader. The most recent addition is an automatic landing system which couples the I.L.S. to the autopilot and permits the machine to be brought to within 50ft of the ground without the pilot touching the controls.

Maximum take-off weight is 18,000 lb, top speed 565 kt, range about 1,000 statute miles, and service ceiling "over 45,000ft." Stencillings on the example displayed made reference to an E-4 fire control system, command radio, VHF-UHF antenna, 05 servo control, flight data computor, CSTI equipment, angle of attack computor, rocket computor, marker beacon antenna, rocket temperature correction potentiometer, tape recorder, and V.H.F. navigation receiver.

Boeing B-47E Stratojet. Placarded as an atomic carrier (medium) of the 68th Bomb Wing (M), this Marietta-built B-47 bore inscriptions referring to upper and lower radar compartments (starboard), quick-operating bomb doors, fuel bomb bay auxiliary (3,258 U.S. gal), external A.T.O. rack provision ("personnel must avoid this area for a distance of 10ft outboard from airplane after A.T.O. system has been armed"), approach chute, and—aft of the rear bomb bay tank—AN APN-76. Only the following rockets may be used in rack assembly 4-3639: 14 AS 1000 Mk 2 Mod 3, 41 DS 1000 Mk 4 Mod 1. (The 14 AS 1000 has a rated thrust of 1,000 lb and a duration of 14 sec.)

Lockheed RC-121D. Specifically developed for early-detection of enemy aircraft and powered with Wright R-3350-34 Turbo-Compound engines, this tip-tanked Super Constellation variant carries a crew of up to 31 men. The radar is effective at 180 miles from a height of 25,000ft. The show machine was provided by the 8th Air Division.

Martin RB-57A Canberra. It was gratifying to see the name Canberra used in official U.S.A.F. documents describing the RB-57. Shiny black, with red lettering, the RB-57A on view was equipped with Shoran. There are built-in brooms to keep the rotary bomb doors running clean.

Stroukoff YC-123F Pantobase. This ingenious development by Michael Stroukoff has a sealed hull for flotation and two sturdy skis, for land or water use, extensible from the hull bottom. The normal retractable land undercarriage is fitted, and there are outboard stabilizing floats. For water operation the skis are lowered and, by virtue of lateral aerofoils, surface at about 20 m.p.h. Notwithstanding the numerous modifications and additions, cruising speed is given as 179 m.p.h. Sixty troops or 9 tons of freight can be carried. I heard that six of the new Fairchild-built C-123s are being converted along similar lines.

Lockheed F-94C Starfire. This all-weather fighter had evidently been living up to its name, for much of its paintwork was stripped. It bore references to radar receiver/transmitter, APX-6 receiver, roll servo, angle of attack computor, Zero Reader, flight data computor and altitude transducers.

Northrop F-89D Scorpion. Powered with General Electric J-35-21 turbojets and armed with 104 Mighty Mice rockets, this all-weather intercepter also carried two 300 U.S. gallon underwing tanks (empty weight 140 lb) with Pastushin ejector cartridges. The rocket pods were labelled "Remove door and install grounding cable before unloading rockets."

Bell X-1B/Boeing XGB-29. The Bell X-1B is powered with a Reaction Motors XLR-11 rocket, is capable of over 1,600 m.p.h. and of flying at over 80,000ft. Thirty-three miniature representations of the machine are painted on the fuselage, the tenth being in green whereas the others are red, and bearing the inscription "1,650 m.p.h. Major Charles Yeager." Inscriptions on the fuselage refer to loxygen filler, capacity 500 gal; nitrogen filler (fill to 4,800 p.s.i.); breathing oxygen; radio receiver/transmitter; radar beacon; and hydrogen peroxide pump drain. Numerous points are marked "Caution, thermocouple attached." The XGB-29 mother-ship is very extensively modified from a B-29A.

Lockheed T-33. One of these trainers appeared with a 70 lb-capacity baggage container—or "travel pod"—under the fuselage.

Fairchild C-123B. A brand-new machine off the line, this impressed by its capacity and ease of loading. Sixty-one fully equipped troops, or 50 stretcher patients plus six sitting patients and six attendants, are possible loads. Speed range is 75-245 m.p.h.

Lockheed C-130A. On bringing this machine in the pilot shut down the Allison T56 turboprops only after a crew-man had established intercommunication from outside. This man scrutinized each engine separately before it was stopped. The nacelles and the centre part of the aircraft bore such warnings as "Stand clear, turbine wheel. Stand clear, starter turbine blades. Danger, propeller. Keep clear, turbine exhaust."

Hughes Falcon. This air-to-air guided missile was labelled YGAR-1 and bore the serial number GM-52-2457, denoting that the show specimen was manufactured three years ago.

Martin Matador TM-61. Length of this tactical flying bomb is 39.5ft and span 28.5ft. Speed is over 650 m.p.h. and ceiling more than 35,000ft. The weapon has been in production since 1951.

U.S. NAVY

Douglas A4D-1 Skyhawk. This fascinating little attack machine (which may yet be developed as a fighter) has had its share of teething troubles, and the specimen at Philadelphia appeared with vortex generators on wings and fuselage. A cockpit notice warned the pilot not to exceed 375 kt I.A.S. or 0.8 Mach. I gathered that this particular machine was due to undergo carrier suitability trials.

Kellett KH-15 Stable Mabel. A tiny helicopter, built to study the stability and handling characteristics of small single-rotor machines, and having its rotors driven by hydrogen peroxide rockets at the tips. Mabel has made over 250 flights to date and has been extensively flown hands-off, using only the pilot's "Body English" (I quote the placard) for control.

Douglas A3D-1 Skywarrior. Span and length of this carrier-borne attack bomber were announced as 72.5ft and 76ft, speed as 500 kt, range as 2,000 nautical miles, and service ceiling as 41,000ft. The crew comprises pilot, co-pilot and bomb-aimer/radar operator. The pilot was enjoined not to exceed 500 kt E.A.S. to 10,000ft, nor to land the particular machine on view aboard an aircraft carrier. Price, two million dollars.

Miscellaneous Navy Exhibits. The Navy showed, among other things, a model of their Mk 7 arresting engine, capable of halting a 60,000 lb aircraft, landing at 120 m.p.h., in 200ft. It absorbs 30 million ft-lb in 3 seconds. Models also showed how the Navy's HUP anti-submarine helicopters lower sonar gear. When a submarine has been detected other HUPs assist in pin-pointing the location and weapon-carrying helicopters are then brought in for the kill.

MARINE CORPS

Miscellaneous Exhibits. The Marines showed specimens of the geodesic dome and an arsenal of munitions, including the 5in aerial rocket, 6.5in anti-tank aircraft rocket, 3.5in smoke rocket, and miscellaneous bombs, including a 325 lb depth bomb and a 1,000 lb G.P. incendiary bomb.

COMMERCIAL

Bell V.T.O.L. This machine was labelled with the name of its test pilot—Dave Howe—and bore 28 black representations of itself, denoting flights, and one in red, signifying a transition. The oil tanks have been removed from the J44 turbojets and mounted on the airframe. A clearance of about 3ft was found to be sufficient from the ground to the exhaust nozzle in order to prevent excessive recirculation of exhaust into the engine intake. Weight is 2,000 lb.

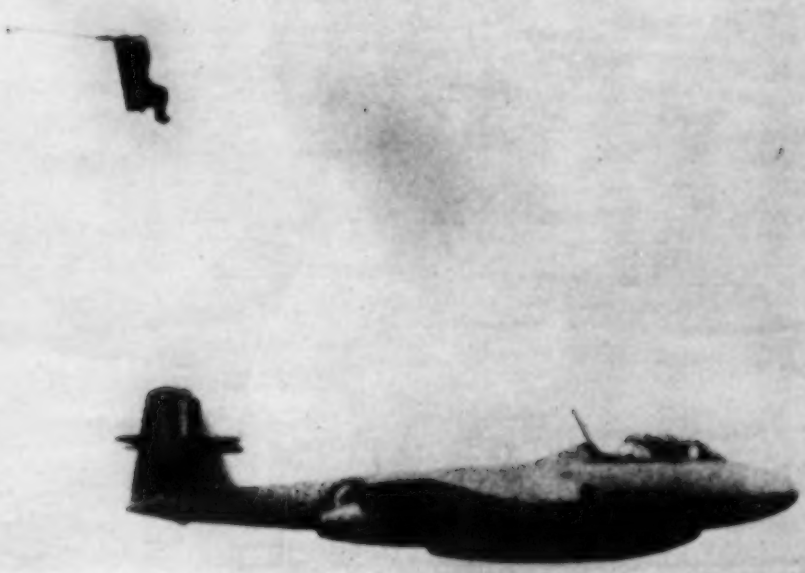
Bell. On the Bell stand were references to the GAM-63 Rascal weapons system (the Rascal is an air-to-ground guided bomb) and to a B-47 director aircraft. Bell also made it known that they are the major source for Nike power plants.

Aero Commander Super 680. A new, high-performance version of the Commander, having Lycoming GSO-480-A1A supercharged engines which confer a cruising speed of 260 m.p.h.

P. and W. Engines. Pratt and Whitney showed a titanium compressor rotor for the JT-3, having the same strength as the steel product and weighing "one-third" less.

Canadian Representation. I was especially glad to see that Canada was represented by P.S.C. Applied Research, Ltd., and Lucas-Rotax. P.S.C. showed the control intervalometer used to set the rocket-firing pattern of the CF-100 fighter, and the automatic ice-detection and shedding system fitted to the same aircraft. They had, too, the R-Theta air position indicator.

FOREMOST IN AVIATION SAFETY



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RADIO ON SHOW

Airborne and Ground Equipment Seen at Farnborough: A User's Comments

THE stands of the radio industry at this year's S.B.A.C. Show were noteworthy for the appearance of fully developed equipments rather than for the display of new systems or applications of new techniques. Leaving out developments still under security classification, some kind of stability is evidently being reached, at least in the basic radio communication and navigation equipments now required for the operation of the civil transport aeroplane. So if—with important exceptions—there was little to tickle the palate of the aeronautical radio specialist avid for something new, there was much evidence of a strong and thriving radio and electronics industry capable of providing for all the needs of the aircraft operating industry both in the air and on the ground. The field of choice, whether it be for long or short range communications or for radio navigational purposes, is now a very comprehensive one, and the new aircraft at the Show can be matched by the appropriate "black boxes" for whatever is their role.

So far as new systems are concerned, the honours for an important debut go to TACAN—prominent on the stand of Standard Telephones and Cables, Ltd. Under development for a long time as a defence project in the United States, and later here, TACAN has very recently emerged from the security bag; and there it was, a masterpiece of compressed complexity, for all to see at Farnborough. It is, of course, the first integrated azimuth distance system to be developed to satisfy the operational requirements for a tactical air navigation system for air forces and at the same time to qualify for acceptance as the "common system" of radio navigation for civil and military transport aircraft on the Federal airways of the United States. It is an integrated—and in many ways an elegant—system in the sense that the two elements of information needed in a polar co-ordinate navigation grid are derived from the one interrogator-responder link.

The ground installation (given the type number STURN 3 and consisting basically of a ground beacon with a rotating antenna system) and the airborne interrogator (STARN 21), form a complete V.H.F. pulse system which operates on 126 channels in the band 962-1,214 Mc/s. It provides bearing and slant range information at line-of-sight distances up to a maximum range of 200 n.m. The system is saturable—though up to 100 aircraft can simultaneously interrogate the beacon and obtain distance as well as bearing—but the beacon always broadcasts bearing information to any number of aircraft. Aural identification of beacon code is provided. In the equipment shown by S.T.C., both the distance information and the bearing, which is without ambiguity, are presented on a single combination instrument. In U.S. releases, claims are made for a bearing error of less than one per cent and an accuracy of distance measurement of better than half-a-mile at maximum range. Achievement of this performance calls for optimum siting and tower mounting.

TACAN ground beacon (Standard Telephones and Cables, Ltd.).

"Flight" photograph

What TACAN will do to or for civil air transport operations it is early to judge and extremely difficult to forecast. The system competes with the internationally standardized, but hardly implemented, distance-measuring equipment. It is difficult to see how D.M.E. can survive the emergence of TACAN. Furthermore, the new system makes its appearance just at the time when the availability of low-cost V.O.R. ground installations and fully developed airborne receivers gives rise to the legitimate hope that the transport operator can at last expect to see some very necessary and overdue improvement in the terminal area and *en route* aids he has to use, especially on the long-haul routes of the world. It will be hoped by many that the very existence of TACAN, now publicly known, does not turn out to be the enemy of the simple V.O.R. now finding its way slowly into use.

The very great interest now being shown by the aircraft operating industry on both sides of the Atlantic makes the appearance of a new cloud-warning radar by E. K. Cole both timely and welcome. It is understood that the new equipment, the Type E.120, was designed in conjunction with B.O.A.C. and is based on the practical data obtained from the operational trials in South East Asia of the earlier E.38 model. The complete equipment consists of scanner, transmitter-receiver unit, servo-synchronizer unit and an indicator-control unit, conforming to standard S.B.A.C. practice and weighing less than 150 lb. The increased system-performance required to give detection ranges up to 120 n.m. has been obtained partly by a sixfold increase of power over the E.38, i.e., to 60 kW and by improvement of the receiver noise-factor.

The equipment operates in the X (3 cm) band. The decision to use X rather than C band was gone into very thoroughly by the designers, who consider that the higher angular discrimination (for a given scanner size; this is all-important in the nose of an aeroplane), and greater radar range in clear air of the X-band as compared with C-band more than offset the higher attenuation suffered by X band when there is heavy precipitation between target and radar. Early operational experience in typical storm areas on overseas routes vindicates the choice.

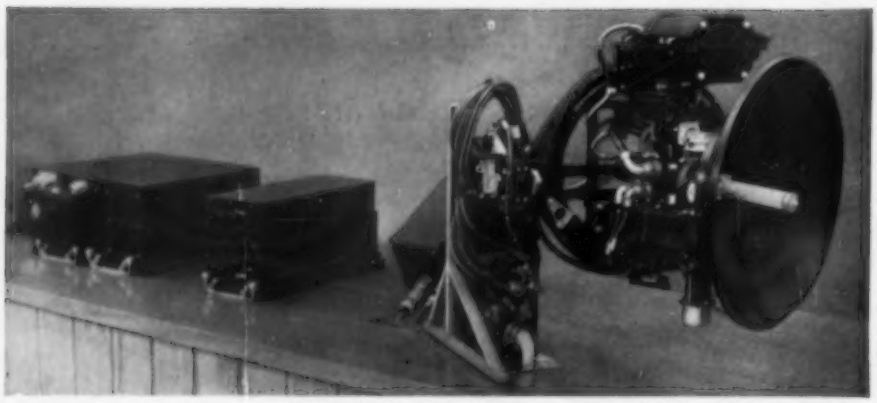
Operationally, targets are displayed on a 5in off-centred P.P.I. high-brightness tube which should be visible in a large range of flight-deck ambient lighting conditions without a vizor. To assist in the estimation of degree of turbulence likely to be experienced from target clouds, "iso-echo contour" facilities are included, but can be switched "in" or "out." This system depends on an assumption, for which there is some practical justification, that the violence or turbulence within a cumulo-nimbus cloud is related to the rate of change of rainfall across the cloud. When "iso-echo contour" circuits are in use the display shows two contours, one defined by the minimum detectable signal and the other by the edge of the "hole" left when the radar returns above a predetermined level are inverted, i.e., made "black" instead of "bright." The separation between the two contours—i.e., the width of the "paint" on the display unit when the radar is looking at a precipitating cloud—indicates the rainfall gradient. A good deal of operational experience will be necessary before conclusions can safely be drawn about inversion settings for "iso-echo contouring" and in the meantime the use of this technique will obviously have to be treated with reserve. However, the utility of the radar is not affected, and in the E.120 special precautions have been taken to ensure that, when "iso-echo contouring" is in action, its indications are independent of range and variations of system performance.

The E.120 beam is 5 deg wide and may be tilted through +7 deg to −17 deg. It sweeps through ±75 deg once per second. Full platform-stabilization to within close limits is provided for the scanner, which can deal with ±45 deg of roll and from 18 deg up to 22 deg down in pitch. This stabilization arrangement is free from geometrical limitations inherent in the "line-of-sight" system and is necessary in view of the wide changes of aircraft attitude for which the scanner has been designed.

It is understood that the E.120 is about to undergo its first operational trials and that B.O.A.C. will be using this radar in Britannia aircraft.

Both Marconi and S.T.C. were showing airborne equipment

RADIO ON SHOW . . .



Ekco airborne warning equipment: scanner, indicator/control unit, servo synchronizer unit and transmitter/receiver.

"Flight" photograph

with appropriate instrumentation for the internationally standardized civil V.H.F. facilities. The S.T.C. equipment, the S.R. 32/33, provides for reception at 100 kc/s channel spacing, of V.O.R. and I.L.S. localizer, for reception of glide-path transmissions on the twenty I.C.A.O. channels in the frequency band 329.6-335 Mc/s and for 75 Mc/s marker signals. The S.R. 32/33 combines the functions of the S.R. 14/15 I.L.S. receivers and the S.R. 31 V.O.R. receiver, both of which have given satisfactory operational service.

The AD.704, jointly developed by Marconi and their Commonwealth sister, Amalgamated Wireless (Australasia), provides 560 channels in the I.C.A.O. band from 108-136 Mc/s covering V.O.R., I.L.S. localizer and V.H.F. communications channels at 50 kc/s separation. Not shown on the stand, but understood to be available, are the partners to the AD.704, i.e., the AD.706 for glide-path reception and the AD.708 for markers. The 50 kc/s channel separation should look after the future and it is understood that the AD.704 has excellent spurious-response suppression.

Another interesting development shown on the Marconi stand was the sub-miniaturized airborne automatic direction finder type AD.722. Noteworthy for its small size and weighing less than 20 lb, the equipment has been designed primarily for use in military aircraft where little space is available. A Bellini-Tosi type D.F. system is employed, the goniometer being contained in the bearing indicator. The iron-cored crossed-loop aerial system is, therefore, fixed and presents the minimum of mounting problems on the aircraft. The actual projection of this aerial above the skin of the aircraft is only ½in, thus permitting a very low-drag installation. Despite its smallness the AD.722 gives a performance similar to that of its big brothers of the AD.7092 series.

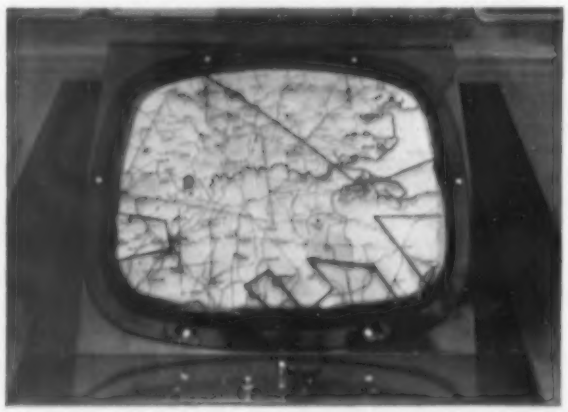
On the subject of A.D.F.s, it may be remarked that the third of the family of Marconi Commonwealth companies, Canadian Marconi, were showing an interesting example of "Americanization" of a basically British equipment. Their C.M.A. 301 A.D.F. is based on the AD.7092 but meets the governing U.S. and Canadian military specifications.

Ground direction finding developments on show included the AD.210C, a single-channel V.H.F. D/F. developed from the AD.200 and destined for the smaller airport where the fuller facilities are not required. The AD.210C can be remoted over telephone lines up to a distance of five miles and, of course, does not require specialist operation. Also to be seen was a visually displayed automatic fixer system shown working with the AD.210C, although it can, of course, operate with other versions of the D/F. equipment. Display was on a rectangular television type C.R.T. on which map or other information could be marked.

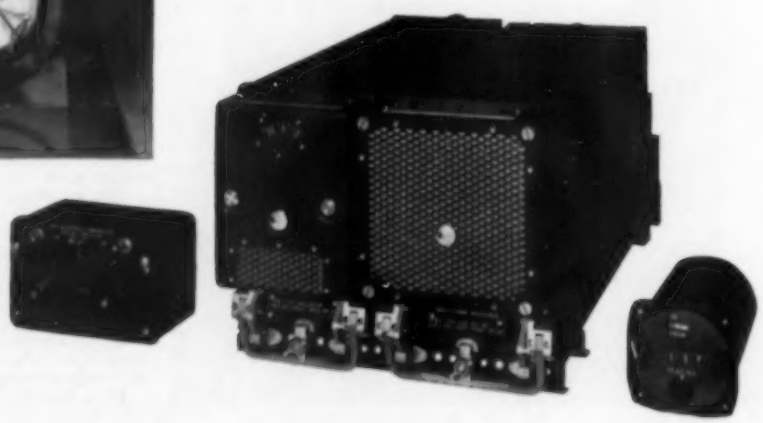
S.T.C. showed a new system of direction-finding which can be applied to the various bands in which a D/F. service is required. The antenna system has a number of elements, disposed in a circle, switched successively to a receiver. There is also a separate single antenna feeding a second receiver having a beating oscillator common with the first receiver. The output of the receiving system is a sine wave at the frequency of the antenna commutating cycle and of phase depending on the bearing of the incident wave. The bearing is determined by phase comparison between this variable-phase signal and a reference signal derived from the system commutating the circular aerial system. Greater freedom from site disturbance and the effects of interfering signals is claimed for the new system. S.T.C. also showed their V.H.F. D/F. type F.G.R.I.X. 1340. This provides remote selection on one of ten pre-set channels in the 225-400 Mc/s band and has been developed for the Ministry of Supply.

There were a number of important developments in the radar field to be seen in the outside section of the Show.

Cossor were showing their combined primary and transponder radar systems. Tests have been made with the transponder system working with London Radar, but here for the first time the ground interrogator aerial was combined with the A.C.R.6 air traffic control radar. Work has evidently been done using the advanced



Above, Marconi visually displayed automatic fixer for use in conjunction with the AD.210C single-channel V.H.F. D/F. equipment.



Right, AD.704 navigation and communication receiver with control unit bearing computor and omni-bearing selector.

centimetric radiator and feeder techniques. The positive aircraft recognition so long demanded by traffic-control operators appears at last to be obtainable within the measurable future.

The Q-band airfield surface-movement indicator radar developed by Decca Radar attracted a great deal of interest. This radar works on a wavelength of about 9 mm, has a horizontal beam-width of less than half a degree, and a pulse length of less than 0.05 μ sec. These are the ingredients for a very-high resolution radar and on the 12in P.P.I. display the constant movement of aircraft on runways and cars in the parking areas at the Show could be very clearly followed. This was the second of these Decca Q-band radars to be built, the first now being installed in the control tower at London Airport.

Decca also showed their air surveillance radar type M.R.75. This is a low-cost equipment giving a range of 75 miles on large aircraft at 25,000ft. The radar, which is X-band, has presentation incorporating the Decca fixed-coil universal display. This display adjunct can be put to a wide variety of uses. Typical applications are to provide range lines which may be varied in range and position at will, allowing the range and bearing between two targets not related to the origin to be measured; used in this way it is a simple and flexible data extraction system. Runways and approach paths can readily be marked and it clearly has a very wide variety of additional uses. Hitherto, the "fixed coil" principle has been little used except in classified military radars.

A model of their S.232 50 cm airfield control radar was shown on the Marconi stand. This equipment, which is to be installed at London Airport, has the advantage of being substantially unaffected by heavy rain or other precipitation. It has also a very effective moving-target indicator system for the elimination of permanent echoes which would otherwise mask the aircraft responses.

Principal advance in the past year by the Decca Navigator Co. has been the development of their Mk 10 receiver for airborne use. While retaining all the advantages of the present system to users of the Mk 7 receiver the company claims the new techniques will provide automatic lane-identification of improved range, will add zone identification as an additional facility, will extend the use of a single receiver to all Decca chains by use of the superheterodyne principle and will remove the complexity of setting-up procedures now inherent in the Mk 7 equipment.

Mk 10 Decca involves the transmission, from each station of a chain in turn, a single burst of simultaneous radiation on all the frequencies currently used on that chain at intervals of one minute to provide all but one of the above-mentioned facilities, and the addition of one extra frequency only to provide zone identification. Harmonically related, these frequencies produce an elementary pulse with a recurrence frequency of their common sub-harmonic, and it is arranged that when the skywave deviations of phase on its various components are moderate (i.e., when skyways field strength is less than 40 per cent of groundwave field strength), and the pulse is in its correct position relative to the separate components, the Mk 10 receiver employs it to achieve lane-identification functions; when these deviations are beyond tolerance the receiver ignores the pulse.

It is to be noted that this provision of a pulse whose characteristics enable the receiver to differentiate between "good" and "bad" lane-identification information is the new feature in Decca which enables automatic lane-identification to be realized, and this pulse is reproduced in the receiver from only four harmonic spot frequencies separately received in narrow-band circuits so that the frequency-wasteful transmitted bandspread and the necessity for very wide receiver bandpass, which are features of conventional pulse systems, are avoided.

Mk 10 Decca, which thus marries the merits of continuous-wave and pulse techniques, will enable the user to fly from base after a simple switch-on procedure, his Decometers having been automatically regulated to their correct readings within the zone. Any interruption in integration will similarly be automatically rectified. It is understood that operational trials will begin very soon.

An important development of the established I.C.A.O. standardized instrument landing system was shown by Pye. The equipment is derived from that developed in conjunction with the Ministry of Supply some years ago, but much modification and re-design have given greater stability of performance and, particularly, ease of setting-up. The major change, from which most of the improved features flow, is the adoption of a very greatly simplified antenna for the localizer transmitter. A parabolic antenna system is excited by two horizontal dipoles, one for the 90 c/s modulation, the other for the 150 c/s modulation, disposed one on each side of the axis of the parabola, which is 70ft wide and 12ft high, the reflecting surface being built up of horizontal wires about 6in apart. It is said that the parabolic antenna system is so designed that on assembly it assumes the desired unique shape, and this fact taken with the obvious ease of making adjustments, makes the I.L.S. in overseas locations much more reliable. The main disadvantage of the new aerial is that it "looks" only in the one direction, i.e., there is no back beam, but in the majority of civil operations an aircraft using I.L.S. will do so from a holding point or on to a locator and no operational disadvantage will be felt.

Also to be seen on show, by Pye, was a new marker beacon transmitter.

Evidence of first steps towards transistorization of airborne radio equipment was to be found in one or two places at the Show. One example, to be seen on the Ultra stand, was of a standard station box, for flight-deck intercommunication use, in which the inside had been experimentally converted to transistor circuitry. A second example was that of the transistorized noise-cancelling microphone for air use, shown by the Canadian Marconi Co. Mullard also showed transistor applications. Since the weight of the radio installation in the modern long-haul transport aeroplane is approaching one thousand pounds (and still growing), these small signs that the growth can be checked are most welcome.

The majority of the exhibits on other radio stands was, by and large, of well-known equipments which have been seen before but which were none the less in welcome evidence because many of them have been through the hard proof of operational service.

As we said at the beginning, there is now available from British resources an altogether comprehensive range of radio communication and navigation equipments to meet the wide and exacting demands of the air transport industry.

ROTOR BLADE PRODUCTION DISCUSSED

FOLLOWING the paper on the design and development of helicopter rotor blades presented to the Helicopter Association on September 8th by R. Allen Price and Frank L. Stulen, a discussion was held, which is summarized below. The report of the lecture itself appeared in our issue for September 9th.

Mr. T. L. Ciastula (Saunders-Roe) congratulated the lecturers on presenting a paper of great importance, but asked why they had so severely criticized the method of stress simulation on a blade whirl tower. He also asked how the testing of bonded joints in rotor blades was carried out in the U.S.A., and expressed the opinion that it would be of interest to do a series of fatigue tests on a blade with riveting only spanwise and not chordwise.

Mr. J. S. Shapiro (consulting engineer) thought that the achievement of the Parsons Corporation in having produced 10,000 rotor blades was most significant, and had proved conclusively the safety factors which could be obtained in a rotor system. He asked whether the metal blade based on sheet metal and brazing represented a departure from all other approaches in design, and whether the honeycomb trailing-edge section had not been found to be as satisfactory in production as the section finally chosen by the Corporation.

Dr. H. Roberts (Fairey Aviation) asked how the Parsons Corporation could exist in the U.S.A.—there was no comparable organization in Great Britain. Did the techniques in use hold good for the production of large rotor blades, and was bonding satisfactory when hot gases had to be ducted through the blades? He felt that analysis could not be rejected in favour of extensive testing, and wondered whether the American corporation went to any great lengths to calculate resonance and other characteristics.

Mr. R. G. Austin (Auster Aircraft, Helicopter Division) suggested that the blade operating stress of 14,000 lb/sq in, as indicated by the S-N curves, was rather low, and that a figure of 25,000 lb/sq in would be more desirable.

Mr. T. Pollicutt (Hunting Percival) enquired whether any catastrophic failures had been experienced during the Parsons Corporation's 10 years of blade manufacture, and also invited the lecturer's opinion of future trends in blade design as regards weight reduction, increased life and reduced cost.

Mr. Moore (Hunting Percival) asked how the Parsons Corporation achieved control of weight and c.g. position in the manufacture of their rotor blades.

Mr. Price in reply to the discussion, agreed that more fatigue testing of riveted blade structures would be useful. He did, in fact, believe in whirl-tower testing but thought that it was essential that the test should simulate flight conditions exactly, which was difficult to achieve. His company had a number of different

Five alternative types of rotor blade designed by the Parsons Corporation for the same helicopter. (Right) Fatigue testing of a specimen section.

ROTOR BLADE PRODUCTION . . .

processes in course of development (which would soon be available for use in production) for the testing of bonded joints.

He considered the question of commercial existence to be most important. In his view, the position was that the Corporation were able to provide a good service to the helicopter manufacturers. At the present time, new designs of helicopters were in course of development with a specification for two alternative designs of rotor, one to be manufactured by the helicopter constructor and the other by his own independent firm. In this way, healthy competition was provided and the helicopter project had a greater chance of success. With their streamlined organization they could usually produce blades more quickly than could the larger helicopter constructors themselves.

They had had no blade failures which had resulted in catastrophe. On one occasion, when a blade had failed through fatigue, it had done so because greater loads had been imposed upon it (during a series of special flight tests) than the blade had been designed to take. The helicopter had landed from hovering flight and the portion of the blade which had failed was available for inspection afterwards, providing useful scientific data. Blades designed in the future would probably have a longer service life and would be less costly, but there would probably be no greater reduction in blade weight. Mr. Price left certain other questions to his co-author Mr. Stulen.

Mr. Stulen said that the method of sheet-metal blade construction had been adopted for reasons of economy and because tooling for such a method was easier. The honeycomb section for the trailing edge was difficult in production and was difficult to handle and contour accurately. He said that his corporation did, in fact, carry out considerable analysis into blade flutter, resonance and frequency problems, but testing was necessary to confirm that the results of the analyses were correct. He thought that the principle of riveted blades should not be completely rejected, but that bonding methods were becoming more reliable and new adhesives were being developed to withstand temperatures of the order of 500 deg. F.

The manufacturing techniques were being adapted to blades having a chord as large as 29in, equivalent to a rotor diameter of 82ft. The figure of 14,000 lb/sq in took into account the scatter, the average endurance for the spar in question being 28,000 lb/sq in. Control of weight and c.g. position was certainly an important problem. The majority of the Parsons blades had been produced in matching sets, and one of the reasons for developing the metal blade was that blades could be matched to a master blade and so all be built to the same weight. Production of metal blades, however, was not entirely straightforward, for a variation in the gauge of the metal sheet of a few thousandths of an inch could make a considerable difference in the total weight of the blade. It might be necessary to pick three groups of master blades, building some blades to one master and some to another.

CORRESPONDENCE

The Editor of "Flight" does not hold himself responsible for the views expressed by correspondents in these columns; the names and addresses of the writers, not necessarily for publication, must in all cases accompany letters.

Russian History

IT is good to learn that there are also air historians inside the Soviet Union, and I expect Mr. Meo's letter will have been read with much interest (*Flight*, August 12th, 1955).

There are two or three points that should be queried. Presumably the date of 1885 for the invention of Aleksandr Fedorovich Moshaiski's aeroplane is a misprint for 1875. If it flew in 1882 the date of 1884 mentioned by Gumilevski in *Krylya Roding*, p. 16 (Moscow, 1954) is also a misprint. The date 1882 is supported by all other references, such as Mr. Allward's notes in *Flight*, July 17th, 1953; Wennerstrom in *Röda Virigar*, p. 9 (Malmö, 1946); and an article in *Letectvi*, R. XXIV, 370 (1948). If, as Mr. Allward mentioned, the official records no longer exist, it is difficult to decide the nature of Moshaiski's achievement. It appears that the take-off was made from an inclined ramp, but it would be valuable of we could learn the length of the flight or "hop."

It is good to see attention drawn to the work of Grigorovich, which is certainly insufficiently known and appreciated outside Russia. In the 1920s and 1930s he built many fighters, and N. N. Polikarpor worked with him.

In the latest issue of the "Great Soviet Encyclopædia" (I quote from the German extract *Flugwesen II*, published by Fachbuch Verlag G.m.b.H., Leipzig, 1954) the priority for a Russian seaplane is accorded to I. M. Gakkel, who produced an amphibian in 1911. As for flying-boats, the first one is said to have been made by O. S. Kostovich, in 1911. A Russian licence, No. 25702, was awarded in 1913. The encyclopædia concedes that at the time of the work of Gakkel a seaplane was made in France by Fabre.

Nesterov looped, not on an M-9 (though I think a Walrus has been looped!), but on a Nieuport of some sort. This was on August 27th (September 9th, N.S.) *1913*. The story goes that he was awarded C.B. for unnecessarily risking Government property! This date is given by Gumilevski on p. 59 of his book and is supported by other sources.

Okehampton, Devon. DENYS J. VOADEN.

Radio Recollections

I READ with great interest Mr. P. Oomen's *In Memory of MF and MF/DF* in your issue dated August 5th, 1955. While not concerned with World War I, I also have a very "soft spot" for this now extinct but very important trade, having been a D/F. operator on MF and also HF D/F. during World War II. I, too, can vouch for the amount of pride that each set of operators had in their work and D/F. stations; and—without boasting—OB6 Bottesford was once recognized as "the most efficient D/F. station in 5 Group.

One or two instances still remain vivid in my memory and there was, as Mr. Oomen states, a great feeling of satisfaction when one had helped some particular aircraft to return to base under difficult conditions. One instance I distinctly remember was homing a Manchester back to its base at Coningsby after a particularly hazardous return on one engine in extremely bad QBB and appalling QBA. Although this aircraft was calling 5 Group Headquarters B3S with S.O.S., he was slightly off frequency and as our frequency was only a few kc/s off Group, I heard him quite plainly. After contact he gave a plain-language message telling us of his plight and then proceeded to QDM all the way home. Some 20 to 25 QDMs were passed and eventually the wireless operator on board finally rang through to me and informed me that the aircraft had arrived at Coningsby safely and that he wished to thank D/F. for their co-operation in this matter.

There was always present, as Mr. Oomen states, "a certain code of good behaviour and politeness," and I remember very well his descriptions of GM (good morning), TU (thank you), etc.; but there were also abbreviations of a not quite so polite nature.

I can honestly say that on D/F. I spent five of the most fascinating years of my life and even now, if it were possible, I would give anything to "have a bash" at the old morse key and goniometer and would willingly exchange my present occupation with some fortunate D/F. operator. J. MERCER

Blackburn, Lancs. (Ex-1077165, "OB6").

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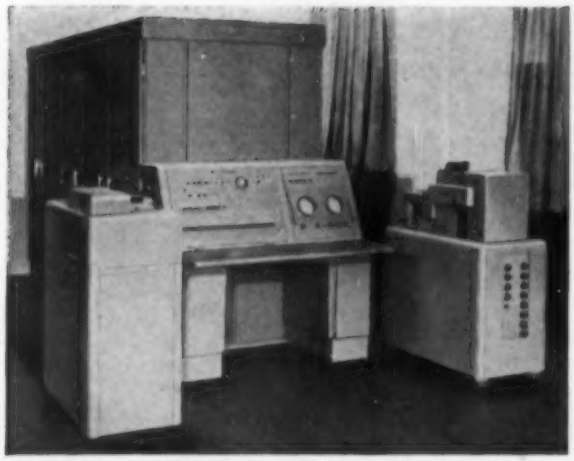

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Mammoth Task

Although of intrinsically sound design, Elephas primigenius failed to survive the Pleistocene period of the Quaternary era. No one knows why the model was dropped; at the time it was the toughest proposition on four legs, and its highly insulating hirsute layer guaranteed immunity from temperature troubles in the arctic conditions of the Ice Age. But its disappearance proved that there was one problem associated with its environment that in the long run proved to much for it. Providing for the wide diversity of conditions under which modern aircraft have to operate constitutes a mammoth problem for everybody concerned. One way of reducing its proportions is to refer all questions about fuel, oils and greases to Esso where there are experts who can either give the answer right away, or who won't rest until they've found it for you.

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CORRESPONDENCE . . .

B.E.A. Operating Statistics

I WAS surprised and concerned to read what I must consider an ill-informed—and, regrettably, ill-disposed—contribution to *Flight* by Mr. Robert J. Blackburn on September 9th about B.E.A.'s Annual Report.

For his "critical survey," Mr. Blackburn has drawn wrong and, apparently prejudiced conclusions from B.E.A.'s annual report for 1954-55. The "full information" which we have attempted to provide there has been twisted—perhaps sincerely—to an extraordinary extent.

Mr. Blackburn's comparison of some B.E.A., T.C.A. and A.A. statistics ignores the operational and economic effects of such influences as traffic flows, aircraft types used and length of haul. Nor does he mention that B.E.A.'s operating profit for 1954-55 was proportionately and actually higher than that for T.C.A.—though he cannot be blamed for not knowing that B.E.A. has now as good a ratio of operating surplus as American Airlines, despite that great airline's 25 years of unimpeded traffic development.

I do not propose, therefore, to waste more of your space in commenting on Mr. Blackburn's ill-considered opinions. Sufficient perhaps to say that, during the twelve months ended August 31st, 1955—B.E.A. carried 2,045,000 passengers, and achieved a net profit of rather more than £1,000,000—operating over an average sector distance of only some 220 miles. In this total, over the full year with all its seasonal variation, B.E.A.'s Elizabethan aircraft made a net profit of about £90,000 for a mean sector distance of 310 miles, while B.E.A.'s Viscount operations accounted for the remainder over a mean sector distance of 475 miles. Productivity is some 26 per cent above last year and continually improving.

These results are not poor by any standards—even Mr. Blackburn's—though there is no complacency in B.E.A. and we will do better yet. Mr. Blackburn's ungenerous comments are, however, a poor return to B.E.A.'s loyal and hardworking staff—neither too large nor underproductive—who have served British aviation and the travelling public conscientiously and well over the years.

Ruislip, Middlesex. P. G. MASEFIELD,
Chief Executive, British European Airways.

I WAS most interested to read the excellent article in *Flight* of September 9th, called "Profit in Perspective". Many of us in the air-transport industry will agree, I think, that Mr. Blackburn's arguments were very clearly put and his comments were most fair and reasonable. Articles of this kind cannot help but do good for the industry and bring prestige to your journal.

London, W.1. H. C. L. LEECH.

[The author comments: "Mr. Masefield does not discuss the main issues raised in the article, so it remains a matter of opinion whether my comments were so wide of the mark. In attempting to assess B.E.A.'s productivity, I used the results of two efficient North American airlines as a yardstick (it would surely have been pointless to use any standards but the highest). Having indicated that the Corporation's productivity is *relatively* low, I set out to explore areas of improvement. I fully realize that the upper limit is set by some of the restricting influences mentioned by Mr. Masefield; indeed, I took care to point out that 'B.E.A.'s particular short-haul and seasonal problems are more severe than those encountered by any airline of comparable size.'

"The news of higher Viscount and Elizabethan profits is pleasing, but hardly surprising. And it lends weight to my plea for a separation of international and domestic book-keeping; I remain convinced that the development of a logical international fares policy for Europe is being held back by the deadweight of unprofitable domestic services.

"The criticisms made in my article were certainly not motivated by any 'prejudice' against B.E.A., and I cast no aspersions on the way in which members of the staff perform their individual tasks."—Ed.]

THE INDUSTRY

Rolls-Royce Exports Appointment

A RECENT appointment to the Rolls-Royce export sales department is that of G/C. D. W. Bayne, who joined the company at the beginning of August. Commissioned from Cranwell in 1928, he spent the first ten years of his service on flying duties in this country and in India. During the war he served in Fighter Command, Middle East and Coastal Command units. He was Air Attaché, Rio de Janeiro, from 1948 to 1951 and his last appointment before retiring was Deputy Director, Air Foreign Liaison (D.D.A.F.L.) at the Air Ministry. As a member of the export sales department he will be concerned with Rolls-Royce export business in Europe.

G/C. Bayne.

Aircraft Oxygen and Nitrogen

A NEW company formed under the title of British Oxygen Aro Equipment, Ltd., with headquarters at Bridgewater House, Cleveland Row, London, S.W.1, represents an arrangement between the British Oxygen Co., Ltd., and The Aro Equipment Corporation of America. The new company's function will be to manufacture, sell, hire or deal in apparatus in connection with the supply, storing and dispensing of liquid oxygen and liquid nitrogen for use in aircraft, and its sales area will be the British Commonwealth and Europe.

Five-litre liquid oxygen convertors made by Aro Equipment for which many advantages are claimed in comparison with the conventional use of cylinders of gaseous oxygen for high-flying breathing have been installed in a number of American aircraft, notably the Martin B-57. In addition, the Corporation are suppliers of oxygen demand regulators. The British Oxygen Company have also been developing convertors.

One of the uses for liquid nitrogen is for the production of an inert atmosphere in fuel tanks to prevent the danger of explosion.

The authorized capital of British Oxygen Aro Equipment, Ltd., is £50,000, divided into 50,000 shares at £1 each. Directors are Mr. F. J. Clark (managing director, B.O.C.); Mr. B. Seamen (general manager and a director of British Oxygen Engineering, Ltd., a B.O.C. subsidiary); Mr. J. Anderson (vice-president of Aro Equipment Corporation); and Mr. A. B. L. Murison.

Dart Development

AFTER our report of Mr. J. D. Pearson's lecture on Rolls-Royce turboprops (see pages 502-4 last week) had closed for press we were advised by his company of the following amended figures for the histogram of performance-development published on p. 503: cruise s.f.c. for RDa.7 (stage 1), 0.600; for RDa.7 (stage 2), 0.58; take-off t.e.h.p. for Dart 505 and 506, 1,547; for Dart 510, 1,740; for RDa.7 (stage 1), 1,980; and for RDa.7 (stage 2), 2,120.

G/C. Douglas Bader, aircraft adviser to Shell Petroleum, signs for the delivery of two Whirlwinds ordered from Westland Aircraft by Royal Dutch Shell. The helicopters will be used in connection with offshore drilling operations in the Persian Gulf. With G/C. Bader is Mr. E. C. Wheeldon, Westland managing director. (See news item, page 509.)

With its four Proteus 705 turboprops spinning quietly, Britannia G-ANBC taxies out at London Airport to begin its current series of overseas proving flights. Two flights, to Johannesburg, had been completed at the time of writing and a third—to Tripoli—was scheduled.

CIVIL AVIATION

£1M LOAN FOR TWIN PIONEER

PRODUCTION of the Scottish Aviation Twin Pioneer, which made its public debut at Farnborough this month, is to be backed by a £1,000,000 loan from the Finance Corporation for Industry, Ltd. This sum is to be made available as the production programme requires.

Announcing the loan, Scottish Aviation say that the Farnborough demonstrations, and private viewings by the Ministries and Services, "fully confirm the plans decided upon over a year ago that the world-wide need for this type of aircraft justified a mass production programme." This decision, the statement adds, was not entirely a company one; the British Ministries and colonial and foreign governments were consulted. In addition to the Finance Corporation loan, the Government registered its support with a token contribution to development costs.

CONVAIR 440s FOR SWISSAIR

AN order for eight Convair 440 Metropolitans was announced by Swissair on September 15th. The aircraft, for use on European services, will be delivered between May and October, 1956. The Metropolitan is a quieter and slightly faster version of the familiar Convair 340. Swissair are the fourth European airline to adopt the type, the other customers being S.A.S., Sabena and Finnair. The Scandinavian order for 11 Convair 440s was announced at the end of August and it was followed within a few days by the announcement that Sabena had bought 12; the number ordered by Finnair has not yet been published.

This sudden revival of Convair sales came at a time when the Viscount appeared almost to have eliminated competition from the twin-engined American airliner. All four companies could have been regarded as prospective Viscount customers and their choice of the Convair is undoubtedly a setback to Vickers. Moreover, it halts—temporarily, at least—a welcome swing towards standardization of medium-stage equipment in Europe, with its possibilities of interchange and other forms of co-operation.

Superficially, early delivery appears the main reason for buying the American aircraft. It is quite possible that all the companies concerned would prefer to be taking delivery of Viscounts rather than Convairs—now that the turboprop airliner has proved itself in service. Last year, however, when Viscounts were offered for 1956 delivery, they felt unable to take the plunge.

TO PARIS BY COACH-AIR-COACH

ON September 30th it will be possible to travel between the two city centres of London and Paris by means of a new road-air-road service, the off-peak fares for which will amount to only £7 14s return. Scheduled over-all time for the journey from the Victoria Coach Station, London, S.W.1, to the Moderne Palace Hotel, 8 Place de la Republique, Paris, will be 6 hr 50 min.

There will be a daily service throughout the winter, but approval has been granted to increase the frequency as required up to 21 services daily. The coach will leave Victoria at 0845 hr arriving at Lympne at 1154. The take-off from Lympne is scheduled for 1215, landing at Beauvais at 1315. There the coach service will leave at 1345, arriving in Paris at 1535. The incoming service will leave Paris at 1125.

Behind this new venture (as we reported last July) are Skyways, Ltd., who have been responsible for the co-ordination of the various interests involved. The company firmly believe in the successful economic short-haul operation of their modified Douglas DC-3s for the journey between the airports of Lympne and Beauvais, for it is to and from these airports that the passengers will be taken by special express coaches, which will be operated respectively by the East Kent Road Car Co., Ltd., and Transports Renault.

And so, after many months in the doldrums, Lympne takes on a new lease of life. But perhaps the most interesting facts concern the resuscitation of Beauvais, for it is the story of the enterprise and co-operation of local townsfolk and ministry officials who believed in the future of their aerodrome.

In 1920 the grass airfield was being used as an alternative for Le Bourget when QBI was in force. It saw service with the French Air Force in 1939 and 1940, but then the town of Beauvais was unmercifully bombed and shelled by the advancing Germans. During the occupation, the mortar and brick rubble of old Beauvais was used to make the two runways, which were in turn dealt with by Allied bombers. After the war it was handed over to the civil authorities and fell into quiet disuse.

Fortunately for Beauvais, the Ministry appointed as commandant M. de Lamaze, who had served with the R.A.F. during the war. The main 31-13 runway, 1,348 yards in length, was repaired. Situated on the top of one of several surrounding hills (345ft a.s.l.), the runway—at present the only one in use—is free from approach obstructions. M. de Lamaze forthwith saw to the installation of M.F. Gonio (the V.H.F. type will be intro-

Terminal buildings at Beauvais-Tillé where, as reported above, preparations have been made for the start of Skyways' new service.

duced shortly), a sodium flare-approach extending for over 1¼ miles, and sodium pyramid lights down the runway. The reward for this enterprise came first when Air France began using Beauvais for training purposes and finally when Super Constellations were diverted from Paris to Beauvais in November 1953.

In December 1953 he approached M. Marcel Communeau, President of the Chamber of Commerce of Beauvais and Oise. M. Communeau, a flying enthusiast in the years before the war, and a leading industrialist in Beauvais, saw to it that the people of his town backed the venture. £5,000 was voted towards the cost involved in renovating the airport. Disused buildings were converted into Customs sheds, offices, waiting rooms and restaurant. The Commandant set to and painted his own office.

A small subsidiary 875-yd grass runway strip was cleared parallel and adjacent to the S.W. side of the main runway for small visiting aircraft (pilots should on no account use either the alternative 05-21 runway or attempt to land on the grass except on the strip adjacent to the main runway, for the reason that there are still a number of bomb craters hidden by grass!).

DC-7C PROGRESS

THE wing and fuselage of the first Douglas DC-7C were joined at Santa Monica on September 2nd. This event, say Douglas, coincided exactly with the schedule established more than 18 months previously. The aircraft is due to emerge from its assembly building early in November and to make its first flight in December. Orders for the new machine have now reached 102.

"WRONG RUNWAY" ACCIDENT REPORT

RESULTS of the public inquiry into the accident to B.E.A. Viscount G-AMOK, which was badly damaged on January 16th when attempting to take-off from London Airport, were announced last week by the M.T.C.A. Printed copies of the report will be available from H.M.S.O. in a few weeks' time.

The accident occurred in bad visibility when the aircraft struck a barrier on the stub of a disused runway which had not been in use since June 1949. Minor injuries were suffered by the captain and one passenger. The strip in question was parallel to the runway in use at the time (15R).

The report found that the cause of accident was a mistake by the commander of the aircraft, Capt. E. J. Waits, due to over-confidence, in failing to make any reasonable check that the aircraft was in fact lined up on 15R. It found also that 1st/Off. R. S. Barratt, who was in physical control of the Viscount, was equally over-confident, though his responsibility was less than the captain's. The report concluded with a number of recommendations concerning the markings of runways and taxiways and the system of controlling aircraft on the ground at L.A.P.

A B.E.A. statement said that the Corporation's own inquiry had reached similar conclusions to those of the official report. Both pilots had returned to flying duties after temporary suspension and loss of seniority.

AMERICAN SHORT-HAULER

HEADED by Mr. Jack Frye, pioneer pilot and president of T.W.A. from 1934-47, a corporation has been formed in New York to build and market a new short-haul aircraft. To be known as the Frye F-1, the aircraft is due to fly next year; initially, it will be powered by four P. and W. Wasps, but the airframe has been designed to use turboprops. Its sponsors plan to build the aircraft in America, Britain, the Continent and, possibly, Latin America, "in association with a British manufacturer or by licence."

Artist's impression of the Frye F-1 project described below.

As a passenger-carrier, the F-1 will accommodate 50-60 people; as a freighter it will lift four to five tons from small fields, five to seven tons under less restricted conditions. Essential features of the design are a high wing, with airscrew slipstream over most of the span, and a fixed nosewheel undercarriage. Its range will be 250 miles, and the cruising speed is quoted as 150 m.p.h. (piston engines) or 170 m.p.h. (turboprop). The F-1 will be designed to operate from 1,000ft fields, taking-off and landing at a speed of less than 55 m.p.h. The basic price is reported to be £125,000. Mr. Kurt Weil, designer of the Ju 52, is said to be closely associated with the project.

ELECTRA DEVELOPMENTS

PLANS for the largest commercial sub-contracting programme in the firm's history have been announced by Lockheed Aircraft Corporation. The programme, involving four manufacturers, is designed to enable Lockheed to meet delivery schedules with the new Electra turboprop airliner while maintaining a high rate of Super Constellation production. The firms are the Menasco Manufacturing Company; Northrop Aircraft, Inc.; Rohr Aircraft Corporation; and Temco Aircraft Corporation. Menasco will build Electra undercarriages, Northrop will be responsible for tail assemblies, Rohr will build complete engine nacelle installations, and Temco will make flaps and ailerons.

It was announced on Monday that American Airlines had definitely specified the Allison 501 turboprop, rated at 3,750 h.p., to power their fleet of 35 Electras. The initial £4.5m order for the Allison units followed "a careful survey by American Airlines covering engines of all types now available in this country [America] or abroad."

GETTING INTO THE ACT

THE formation of a French air-ferry company to operate in competition with Silver City Airways and Air Charter was announced in Paris last week. To be known as Compagnie Française du Pont Aérien-Air Channel, the company is stated to have been "created under the sponsorship of Mr. Roger Colin, who was the founder and operator in North Vietnam of an independent air transport company called Air Outremer.

Like its British competitors, the company will use Bristol 170s to carry both vehicles and passengers between England and France. It has received the necessary operating authority from the French and British Governments and will begin scheduled services between Le Touquet and Lympne during the coming winter.

Tip-tanked "Super-Gs"—L.1049G Super Constellations — of T.W.A. will enter service on the airline's transatlantic routes on November 1st. In addition to three Super-G services weekly between London and New York, the airline will introduce a weekly through service between London and Los Angeles via New York. This 6,000-mile route will be flown in 21 hr 5 min westbound, thereby, it is claimed, cutting 7 hr off existing "polar-route" schedules.

CIVIL AVIATION . . .

Following the example of B.O.A.C., El Al Israel Airlines have specified the Smiths Flight System for their Britannia 300 LRs. The company has three Britannias on order (with delivery beginning early in 1957), and an option for a further two.

* * *

American Airlines announce the appointment of Mr. Edward A. Challis as European sales representative. Mr. Challis joined T.W.A.'s London staff in 1950 as sales representative and was previously with American Overseas Airlines.

* * *

The first airline flight evaluation of the Boeing 707 was made at Seattle on September 14th by three Pan American captains, each of whom flew the aircraft. Announcing the flight, PanAm said no decision had been reached on the purchase of jet transports, adding that data obtained from the flight would be used in making the final decision.

* * *

American Airlines and B.O.A.C. have announced interline agreements with Seaboard and Western Airlines, who were recently certificated as America's only scheduled transatlantic all-freight airline. The company has not yet begun scheduled services, but is continuing to operate frequent non-scheduled transatlantic cargo flights with Super Constellations and DC-4s.

* * *

The first lodge of the Guild of Air Traffic Control Officers was formed at Birmingham on September 9th. It will be known as the Midlands lodge. At a ceremony at Birmingham (Elmdon) Airport, W/C. G. E. Lillywhite, A.F.C., A.F.M., the Master of the Guild, presented a warrant of constitution to the Master of the lodge—Mr. Maurice Smart, who is an A.T.C.O. at Elmdon. F/L. William Hannant, who is S.A.T.C.O. at Honiley, was elected deputy master.

CLUB AND GLIDING NEWS

INTENDED as a meeting place for gliding and light-aircraft enthusiasts in the London area, a converted basement flat in Victoria, to be known as the Kronfeld Club, is expected to be opened at the end of October. The process of cleaning and redecorating the premises—which had been empty for 2½ years when "discovered" by the Surrey Gliding Club early this year—is now well under way. The work is being done by members of gliding clubs and Popular Flying Association groups near London.

It is planned that the club will be open five nights per week, and that talks by gliding and light-aircraft experts will be given at fortnightly intervals. Among the amenities will be a bar, and it is fairly certain that the subscription will be only 10s. per year with a 5s. entrance fee. At present there are ten more vacancies for founder-members, who are invited to donate £5 apiece towards the initial expense of furnishing.

In providing the only club premises in London available to the younger flying enthusiasts, the Kronfeld Club project deserves active support. Those willing to assist in the work of redecorating will be welcome on Mondays and Thursdays from 6 to 8.30 p.m.; the address is 74 Eccleston Square, London, S.W.1. Membership and other queries should be addressed to Hugo Trotter (chairman of the Surrey G.C.) at 56 Victoria Street, London, S.W.1 (Victoria 6056).

THE removal of a major part of the tax on aviation fuel, for purposes of domestic flights, engine ground trials and test-bed trials, was announced recently in a French Government decree. The price of aviation petrol has correspondingly been reduced, it is reported, from an average of 76 to 39 francs per litre. An expansion of internal air services is expected to result from this step, which is also widely welcomed by the flying clubs and engine maintenance organizations. Hourly fuel cost of a typical light aircraft using an engine of approximately 100 h.p., consuming 20 litres per hour, will now be reduced by half to about 800 francs.

R.Ae.C. PILOTS' CERTIFICATES, APRIL-JUNE

No.	Name	Cl.	Date	No.	Name	Cl.	Date
28,670	B. Watson	2	1/4/55	28,682	V. J. Dalton	4	13/5/55
28,671	J. S. Simson	1	6/4/55	28,683	D. F. Speck	1	16/5/55
28,672	R. J. Snell	1	13/4/55	28,684	L. E. G. Seagroatt	4	19/5/55
28,673	R. H. Whitley	2	18/4/55	28,685	K. M. Hall	1	24/5/55
28,674	P. S. MacGregor	4	21/4/55	28,686	R. O. Altmann	1	24/5/55
28,675	F. J. Ibbotson	3	25/4/55	28,687	H. A. Bridgman	4	1/6/55
28,676	A. V. H. Sturman	1	4/5/55	28,688	J. R. West	4	2/6/55
28,677	B. P. Price	3	4/5/55	28,689	D. C. Fortun	4	3/6/55
28,678	H. B. Lindsay	2	9/5/55	28,690	J. D. Scarlett	4	3/6/55
28,679	P. D. Jarden	4	11/5/55	28,691	R. H. McIntosh	1	10/6/55
28,680	S. J. Marshall	2	11/5/55	28,692	J. S. H. Morrish	4	17/6/55
28,681	J. R. Kilner	1	13/5/55	28,693	J. D. Irving	1	20/6/55

FOR the second year in succession Mr. W. H. Mitchell was the winner of the Fair Oaks Cup flying competition, held this year on September 4th. Pilots Dall and Bish were respectively second and third. During August twelve P.P.L.s were obtained and nine first solos were made, the Vickers-Armstrongs group and the A.T.C. being well represented in these achievements. Exceeding 600 for the third month in succession, Fair Oaks' flying time amounted to 630 paid flying hours, bringing the total to date for 1955 to 3,298 hr.

ANNUAL dinner dance of the Surrey Flying Club will be held at Croydon Aerodrome Hotel on Friday, October 21st. A group flight to Shoreham took place on Sunday last, and on September 25th the club is host to the Elstree Flying Club (which itself was visited by Surrey Club pilots on August 25th). It is hoped to arrange night flying operations during the coming winter.

A source of much interest during the period of this year's National Gliding Championships, the Slingsby Motor Tutor (Aeronca J.A.P. J99 engine) is now syndicate-owned at Lasham.

NEXT special date in the Surrey Gliding Club calendar is November 5th when, "now that the club-house is insured, we will hold our festivities at home." A firework display is planned, and members of other clubs are very welcome—at their own risk. Lasham's Christmas Party will be on December 17th this year.

THE theme of the September issue of *Weather* is *Meteorology and Flight*. Among the contents of this issue are *Flight in a Thunderstorm*, by Derek Piggott; *Clear Air Turbulence and Topography* by H. S. Turner; *Some Effects of the Weather on Aircraft Design and Operation* by David Rendel; *The "Mystery" of Soaring Flight* by Dr. A. E. Slater; and *Condensation Trails* by Dr. R. S. Scorer, who also gives an account of this year's National Gliding Championship.

Weather is published (2s) by the Royal Meteorological Society, 49 Cromwell Road, London, S.W.7.

FORTHCOMING EVENTS

Sept. 19-23. Institute of Metals: Annual Meeting, Buxton.
Sept. 23. Yorkshire Aeroplane Club: Annual Ball, Harrogate.
Sept. 24. Aircraft Golfing Society: Brown Bros. (Aircraft) Trophy.
Sept. 25. St. Albans Model Aero Club: All Britain Model Aircraft Rally, Radlett Aerodrome.
Sept. 28-30. Institute of Physics: Ninth Annual Conference of the Stress and Analysis Group, Sheffield.
Sept. 29. Northampton Polytechnic: "Fatigue of Metals" (first of series of 12 lectures).
Sept. 29-30. Aerodrome Owners Association: Annual Conference, Manchester.
Oct. 1-2. Innsbruck Air Rally: Innsbruck, Austria.
Oct. 4. R.Ae.S.: Graduates and Students Section: Informal Talk on Aircraft Structural Fatigue, by Dr. P. B. Walker, C.B.E., M.A., Ph.D., F.R.Ae.S.
Oct. 6. R.Ae.S.: British Commonwealth and Empire Lecture: "The Growth of Aeronautical Research in Canada during the Post-War Decade," by Dr. J. J. Green, M.B.E.

R.Ae.S. Branch Fixtures (to October 6th):—

Sept. 23, *Birmingham*, Branch area meeting: "Application of a Digital Computer to Gas Turbine Engineering," by G. C. Best. Sept. 26, *Halton*, Paper by an aircraft apprentice. Oct. 1, *Halton*, Annual general meeting and main lecture, "Compound Engines," by A. C. Clinton. Oct. 3, *Halton*, Films. Oct. 6, *Isle of Wight*, "Recent Developments in Production Processes," by W. E. Goff.

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TAJ

SERVICE AVIATION

Royal Air Force and Fleet Air Arm News

P.M. Visits R.A.F.

ON Tuesday of last week Sir Anthony Eden, continuing his fact-finding tour of the Services, visited a number of R.A.F. establishments.

In a Devon of Transport Command he flew from Halton to Wittering to see No. 138 Squadron's Valiants in action. He attended a briefing for one of the routine Bomber Command exercises and, with W/C. Oakley, the squadron commander, inspected the crew, ground-crew and cockpit of one of the Valiants. Having taken the controls of the Vulcan at Farnborough, he is now getting to know the V-bombers well.

From the control tower he later watched 18 Canberras from Nos. 76, 40 and 61 sqns. take off. (No. 61 Sqn. was visiting Wittering while No. 100 Sqn. is based there but was not taking part in this phase of the exercise.) The aircraft took off at 45 sec intervals, using various sections of the two parallel runways available. Finally, before taking off for Coltishall, the Prime Minister watched a fly-past of 12 Valiants from Gaydon, some from No. 138 Sqn. and others from the conversion unit there. At Coltishall he transferred to a helicopter which took him to see various defence establishments in East Anglia. He later visited Ouston in Northumberland.

Wittering, incidentally, is equipped with Ekco approach radar mounted in a small caravan and with Decca A.C.R.7 in its transportable version.

Bomber Command in Australia

TWO Valiants have visited Australia in connection with the Air Force commemoration week there. They are the squadron aircraft which have been on a proving flight in the Far East.

Air Marshal Sir George Mills, who flew to Australia in one of the Hastings which accompanied the Valiants, said at a Press conference in Melbourne last week that Australia required bombers with a range far greater than that of the Canberras she now possessed.

He also is quoted as saying that the new Handley Page Victor would be "even punchier" than the Valiants or Vulcans.

Battle of Britain Week

ON September 15th the annual reunion of Battle of Britain pilots was held in the officers' mess at Biggin Hill. Ninety-five of "the few" were present of the 300 who had been invited. They included Lord Dowding, who was A.O.C-in-C. Fighter Command during the battle, and many of those who became famous as fighter pilots and formation leaders. It is hoped to have a tie for "the few" next year.

After a drumhead service at Biggin Hill on Sunday the new stained-glass windows in the station chapel, containing the badges of the squadrons which were based there during the battle, were unveiled.

The annual thanksgiving service was held in Westminster Abbey on the same day; many relatives of those who lost their lives in the air fighting were present.

Accounts of some of the "at home" displays given at many R.A.F. airfields throughout Britain appear on pages 510-511 of this issue.

R.A.F. Rowing

FOR the first time the R.A.F. held its own rowing regatta, attracting 68 entries from 20 different stations in Britain. The regatta was held on the Thames at Wallingford on September 14th. Cardington won the Victor Scott-Paine trophy for the station scoring the highest number of points in the finals. Other winners were, senior eights, Cardington; senior fours, Medmenham; junior fours, No. 90 Group; novice fours, Henlow "B"; senior sculls, W. H. Rand, Benson; junior sculls, J. Harding, North Weald; novice sculls, P. B. Dack, No. 90 Group; veteran sculls, C. Jordan, Air Ministry; kayak singles, R. C. Blick, North Weald.

W.R.A.F. Central Band

LAST Tuesday the W.R.A.F. Central Band began a tour of eleven cities and towns in South Wales, the Midlands and Lancashire. The band was formed in 1949 and is composed of 28 airwomen under the direction of F/L. M. R. Davis. They will return to their base at Uxbridge on October 1st.

Watching the Battle of Britain fly-past from the Air Ministry roof on Wednesday last week were Marshals of the Royal Air Force Lord Trenchard (seated) and Sir William Dickson.

Low-level Ejection

THE completely successful live ejection at runway level made on September 3rd by S/L. Fifield with a Martin Baker Mk 3 seat could not be repeated in seats of this mark at present installed in Vampire Trainers, V-bombers and other aircraft in service. The demonstration seat was fitted with a specially modified speeded-up release-timing mechanism which is not yet in the seats issued to the Service.

The makers state that present Mk 2 and 3 seats with single drogues are good for ejection in straight and level flight at 200 ft, and that those fitted with the duplex drogues have been successfully tested at 500 kt and 50 ft.

The trajectory of the seat after ejection is substantially parallel to the aircraft's flight path, and, in order that no height shall be lost between ejection and full deployment of the parachute canopy, the flight-path must be horizontal or climbing and airspeed sufficiently high to maintain an effectively horizontal trajectory for between three and five seconds. Ejection at lower speeds would require proportionately more height, and ejection in a dive would, of course, call for an even greater height margin.

Commonwealth Sqn. Commander

FOR the first time No. 24 Commonwealth Sqn. is to be commanded by a R.N.Z.A.F. officer. He is S/L. R. B. Bolt, D.F.C., of Auckland. Previous squadron commanders have come from the R.A.A.F. and the South African Air Force. Though originally formed in 1915 as a fighter squadron, No. 24 is now in Transport Command. It received the designation "Commonwealth" in 1947.

Traditionally exhibited on Horse Guards Parade, Whitehall, during Battle of Britain Week were some of the aircraft which took part in the battle. Seen here is a Junkers Ju88, with an He111 behind. A Spitfire and Hurricane were also shown.

Part of a group of Swedish Air Force Saab J-29s about to leave Luqa, Malta, after a recent five-day visit by pilots of the Swedish Air Force Cadet School to the Island.

SERVICE AVIATION . . .

Operation New World Completed

EIGHT Canberra B.6s of No. 139 (Jamaica) Sqn. have returned to their base at Hemswell, Lincs, after a tour of over a month in the Caribbean area. Altogether the aircraft covered some 22,000 miles, crossing the Atlantic twice between England and Canada.

The force was commanded by A.V-M. J. R. Whitley, A.O.C. No. 2 Group, who also led the team of Canberras which visited the Middle East last year. He said that the tour had been "a magnificent success," helping to foster goodwill in the Commonwealth and adding prestige to British aircraft and to the Canberra in particular.

Appointments

THE following are among recent Royal Air Force appointments announced by the Air Ministry:—

G/C. L. H. Snelling, A.F.C., to H.Q. Maintenance Command, for administrative staff duties; G/C. A. W. B. Barrett to H.Q., No. 19 Gp., for administrative staff duties; G/C. J. H. D. Chapple to the NATO Military Agency, London, for staff duties; G/C. J. H. Greswell, D.S.O., O.B.E., D.F.C., to Air Ministry for duty in the Department of the Chief of the Air Staff; G/C. D. P. Hanafin, D.F.C., A.F.C., to Ministry of Supply; G/C. R. F. L. Hart, to H.Q., No. 43 Gp., for administrative staff duties; G/C. J. McQ. Fitch to M.o.S.; G/C. A. F. Anderson, D.S.O., D.F.C., to H.Q., No. 61 Gp., for administrative staff duties; G/C. L. F. Brown to Allied Forces Northern Europe (Oslo) for staff duties; G/C. G. C. O. Key, O.B.E., D.F.C., to R.A.F. Upwood, to command; G/C. K. A. Merrit to H.Q. Far East Air Force, for technical staff duties; G/C. A. J. M. Smyth, O.B.E., D.F.C., to R.A.F. Kai Tak, Hong Kong, to command; G/C. F. E. Stokes to R.A.F. St. Athan for technical duties; G/C. S. P. A. Patmore, O.B.E., to Air Ministry for duty in the Department of the Air Member for Supply and Organization; G/C. T. S. Rivett-Carnac, D.S.O., D.F.C., to R.A.F. Valley, to command; G/C. D. G. Stokes to H.Q. No. 3 Group for administrative staff duties; G/C. W. P. Sutcliffe, D.F.C., to Supreme Headquarters Allied Powers Europe for staff duties; G/C. J. Woodroffe, D.S.O., D.F.C., to R.A.F. Wittering, to command.

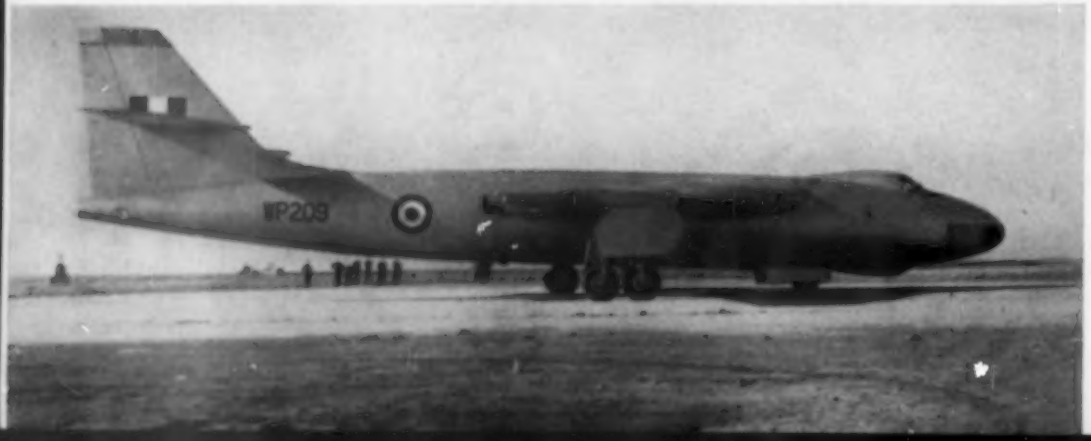
W/C. R. H. C. Burwell, O.B.E., D.F.C., to R.A.F. Aldergrove to command (acting rank of group captain); W/C. J. R. Wilson, D.F.C., to British Joint Services Mission, Washington, for staff duties (acting rank of group captain); W/C. S. G. Baggott, D.F.C., to R.A.F. Thorney Island for flying duties; W/C. C. D. Connerton to H.Q., No. 90 (Signals) Gp., for technical staff duties; W/C. H. Fallows to H.Q., Flying Training Command, for administrative staff duties; W/C. R. L. Fuller, A.F.C., to R.A.F. Waddington for flying duties; W/C. W. A. Griffiths, D.F.C., to H.Q., No. 81 Gp., for air staff duties; W/C. F. W. Higginson, D.F.C., D.F.M., to H.Q. Home Command, for administrative staff duties; W/C. H. B. Hunt, D.S.O., D.F.C., A.F.C., to H.Q., No. 1 Gp., for air staff duties.

W/C. D. S. Lindsay, O.B.E., D.F.C., to No. 36 Squadron, to command; W/C. F. E. Ludgate to Radio Introduction Unit to command; W/C. F. D. Luke, O.B.E., B.E.M., to H.Q., No. 25 Gp., for technical staff duties; W/C. D. F. H. Bird, D.F.C., to H.Q. No. 64 (Northern) Gp., for administrative staff duties; W/C. J. J. Dutton, O.B.E., to H.Q. Maintenance Command for administrative staff duties; W/C. T. P. Gibson, D.F.C., to H.Q. 2nd T.A.F., for air staff duties; W/C. E. V. Masters, M.B.E., to R.A.F. Bridgnorth, for administrative duties; W/C. G. I. Pawson to H.Q. A.A.F.C.E., for staff duties; W/C. W. N. Elwy-Jones to Ministry of Supply (acting rank of group captain).

W/C. D. O. Butler, D.F.C., to H.Q., No. 3 Gp., for administrative staff duties; W/C. A. V. Plowright to R.A.F. Aldergrove for flying duties; W/C. L. Wakelin to No. 3 Radio School for technical duties; W/C. W. J. O. Coleman, D.F.C., to be Military and Air Attaché, Lima and Quito, and Air Attaché, Chile and La Paz (acting rank of group captain); W/C. E. A. Darnell to Air Ministry for duty in the Department of the Air Member for Supply and Organization; W/C. J. W. Taylor, O.B.E., to H.Q. 2nd T.A.F., for administrative staff duties; W/C. J. C. McG. Lunn, A.F.C., to No. 27 Maintenance Unit, to command.

[to be continued

In heavy rain Sir Anthony Eden climbs aboard a Valiant of No. 138 Sqn. at Wittering last week. He was shown the aircraft by W/C. Oakley (centre), the squadron commander, and accompanied by A.V-M. E. C. Hudleston (extreme right), A.O.C. No. 3 Gp.



The Valiant which left at the end of August to carry out bomb ballistic trials on the Woomera ranges, seen after arrival at Woomera.

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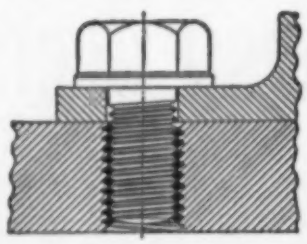

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APPLICATION No. 611. From B.K.S. Air Transport, Ltd., of 1, Marylebone High Street, London, W.1, for an Inclusive Tour Service to be operated with Dakota and Viking aircraft in conjunction with Flamingo Tours, Ltd., for the carriage of passengers and supplementary freight between Southend and Oporto at a frequency of one return flight weekly, operated on Wednesdays, during the season from May-October inclusive, each year, for a period of seven years, commencing May 1956.

APPLICATION No. 612. From Air Kruise (Kent), Ltd., of 1, Great Cumberland Place, London, W.1, for an Inclusive Tour Service to be operated with Dakota aircraft in conjunction with Blue Cars (Continental) Coach Cruises, Ltd., for the carriage of passengers between Lydd and Las Palmas and/or Tenerife, by way of a night stop at Lisbon, at a frequency of one return flight per fortnight departing on Saturdays during the winter period December-February inclusive, each year, for a period of seven years commencing December 1955.

FROM Hunting-Clan Air Transport, Ltd., of 72, Wigmore Street, London, W.1, for the following applications for Inclusive Tour Services to be operated with Viking aircraft in conjunction with Wayfarers Travel Agency, Ltd.:—

APPLICATION No. 613. For a service between London Airport and Munich to be operated once a fortnight on Sundays from 10th June to 2nd September, 1956.

APPLICATION No. 614. For a service between London Airport and Basle to be operated once a fortnight on Sundays from 3rd June to 26th August, 1956.

APPLICATION No. 31/7. From Airwork, Ltd., of 15, Chesterfield Street, London, W.1, for traffic rights between the authorised traffic points in the United Kingdom, i.e. London, Birmingham, Manchester, Belfast and Prestwick, on the internal feeder section of their All Freight Service between London and/or Prestwick and Montreal and/or New York which they are approved by the Minister of Transport and Civil Aviation to operate during the period up to 31st May, 1963.

THESE applications will be considered by the Council under the Terms of Reference issued to them by the Minister of Civil Aviation on 30th July, 1952. Any representations or objections with regard to these applications must be made in writing stating the reasons and must reach the Council within 14 days of the date of this advertisement, addressed to the Secretary, Air Transport Advisory Council, 3, Dean's Yard, London, S.W.1, from whom further details of the applications may be obtained. When an objection is made to an application by another air transport company on the grounds that they are applying to operate the route or part of route in question, their application, if not already submitted to the Council, should reach them within the period allowed for the making of representations or objections. [4257

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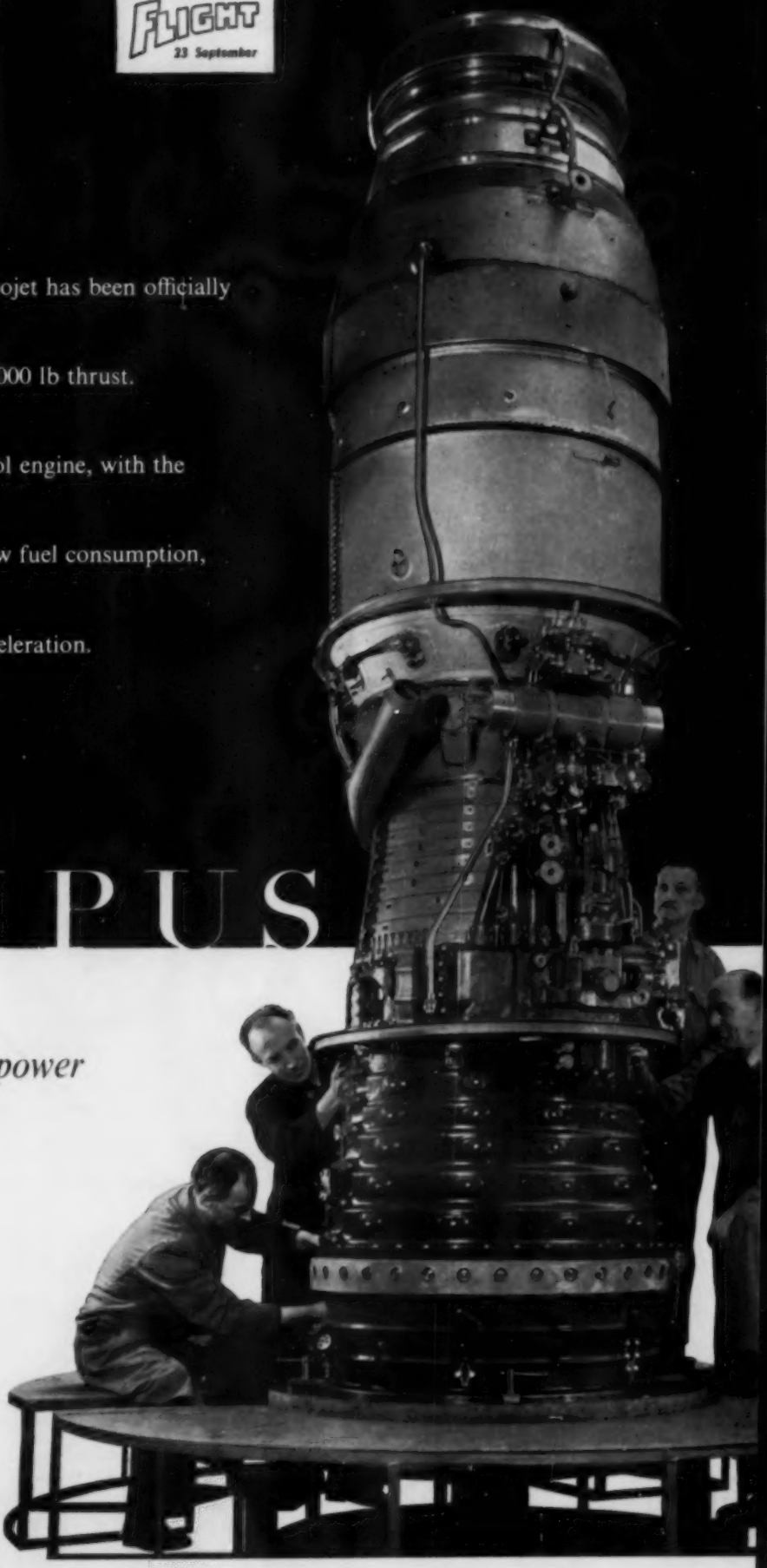

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